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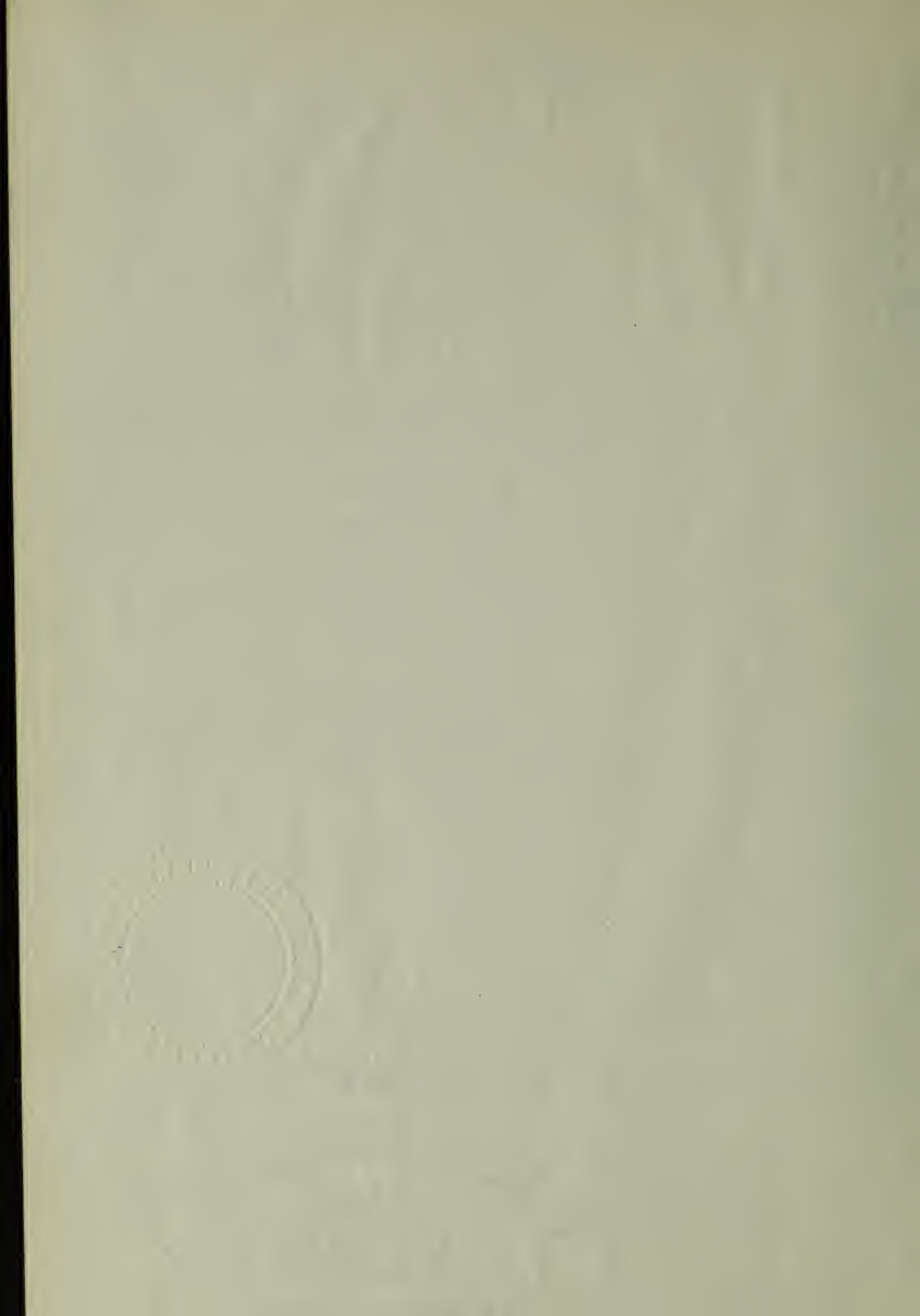College of Business Administration

THESIS

An Evaluation of Economic and Financial

Standards for Electric Operating

Utilities

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by

Robert Webb Lewis
(B.S. in E.E. Tufts College 1933)

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submitted in partial fulfillment of
the requirements for the degree of

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MASTER OF BUSINESS ADMINISTRATION

AN EVALUATION OF ECONOMIC AND FINANCIAL STANDARDS

FOR ELECTRIC OPERATING UTILITIES

1937-1947

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1. INTRODUCTION

A. GENERAL COMMENTS

Since the era of the late thirties, it appears
that the equity securities of the electric utilities have
lost favor with the investor. The industry since 1946 has
been confronted with a huge construction program which will
require large amounts of invested capital. Expenditures for
new construction in both 1946 and 1947 aggregated 1.2 billion
dollars; and it is estimated that new construction for the
three-year period 1948 to 1950 will aggregate 3.4 billion
dollars of which 1.3 billion will be expended in 1948, 1.2
billion in 1949, and .9 billion in 1950. (1) It is assumed
that the new capital will increase capital charges to the
extent that capital costs, coupled with increased taxes, fuel
and labor costs, will soon overtake rate increases gained by
the industry to date. Thus a decline in earnings would re-
sult in a further lack of appeal on the part of the investor
with regard to the industry's equity securities.

The majority of claims made by the proponents of
this reasoning indicate changing trends in certain financial

(1) Tatham, Charles Jr., "Electric Earnings Forecast"
     Public Utilities Fortnightly, Volume XLIII, No. 6,
     p. 344. March 17, 1949.

and economic standards associated with the capital structure, total capitalization, surplus, and operating accounts of the electric operating utilities.

B.   PURPOSE OF THE STUDY

It is the purpose of this study (1) to evaluate the trends of certain economic and financial standards over the last decade for electric operating utilities as given in the standard investment texts, such as Jordan, Badger and Guthmann, Childs and Woodbridge, and Grossman (1); (2) to show, by means of a statistical analysis of current information concerning those economic and financial standards, such changes as have occurred; and (3) to point up the implications of those changes in the light of the over-all financial problem associated with the financing and operation of the electric operating utility industry.

C.   STATEMENT OF THE PROBLEM

In order to fulfill the purpose of this study, it is necessary to evaluate the trends over the last decade, with respect to those economic and financial standards associated with the financing and management of the electric operating utility industry, by means of a statistical analysis of information gathered chiefly from publications of the Federal Power

(1)   See Bibliography Section for complete information concerning these authorities.

Commission entitled "Statistics of Electric Utilities in the United States." It is required that the statistical information selected for use in this study concern the financial operations of the private electric operating utilities along. It is important, therefore, to distinguish between the operating company's financial standards and those of the holding companies. In the former case it is frequently impossible to get all of the specific information necessary to make a detailed analysis from sources other than those of the Federal Power Commission because of the heterogeneous character of the data. The studies of cost units and ratios presented in this thesis are based upon data reported to the Federal Power Commission by privately owned Class A and Class B electric utilities over the decade analyzed.

Other current sources, such as the "Public Utility Fortnightly," the "Commercial and Financial Chronicle," and the various standard investment texts mentioned before, will be used to point up the results of the statistical analyses concerning those economic and financial standards in the light of their implications relative to the over-all financial problems associated with the private electric operating utility industry.

D.   ANALYSIS OF THE IMPORTANCE OF THE PROBLEM

Trend analysis of these economic standards is of vital importance in the determination of the industry's present and future financial position. Accurate trend measure-

ment is not only important in the analysis of the data pre-
sented, but it is important in forecasting the financial
position of the electric power industry in the years ahead.
Although forecasting the future financial position of the
electric power industry with respect to industry in general
is beyond the scope of this study, certain financial consid-
erations have been present throughout the previous decade and
their effect upon the over-all financial problem will be re-
flected in the trend of those economic standards under consid-
eration.

Conservatism both in financing and accounting prac-
tices throughout the electric power industry has been increas-
ingly evident in recent years. In part voluntarily, and in
part at the instigation of regulatory authorities, many com-
panies have eliminated write-ups and other inflationary items
from their balance sheets, and while a certain amount remains
to be done along this line, the pattern has been rather firmly
established. At the same time the industry has had to increase
reserves for depreciation and amortization. The long-term
rising trend of sales and revenues has, together with techno-
logical progress, enabled the industry to maintain the bulk of
its earning power despite rate cuts--sometimes voluntary and
sometimes not--the constant advance in the cost of fuel and
labor, a broad upward revision in the provision for depreciation
and even higher taxes. Intensified regulation of electric
utilities by both State and Federal authorities in the past

decade created considerable investment uncertainty towards
securities, particularly the common stocks of the electric
operating companies. Removal of allegedly inflationary items
from balance sheets often led to lower rate bases and thence to
rate reductions. The Public Utility Act of 1935, with the
death sentence for many public utility holding companies,
brought general apprehension that values represented by holding
company securities would be destroyed. In this study an at-
tempt will be made to determine if there has been a change in
the value of the various economic and financial standards and
to further determine the direction and the amount of those
changes and the implications of those changes relative to the
over-all financial problem.

E.   STATEMENT OF THE ORGANIZATION OF THE CHAPTERS
AND THEIR RELATIONSHIP TO THE WHOLE

Each chapter contained in this study will begin with
an opening paragraph which will contain a statement of that
portion of the problem to which the particular chapter is de-
voted, a description of the materials and methods used therein,
and a definition of the use of the terms contained along with
an enumeration of the points to be covered.

Furthermore, each chapter will contain the necessary
statistical data to indicate the trend of each financial stand-
ard analyzed. The statistical analyses will be followed by a

discussion of the implications of these standards in the light
of their effect on present financial conditions associated
with the private electric operating utility industry. Like-
wise, it will be possible to draw implications concerning the
trends of the specific standards contained in each chapter and
their effect on other standards in the following chapters.

F.   REVIEW OF PREVIOUS RELATED STUDIES

A considerable amount of general information is
available in the standard investment texts concerning the
evaluation of the various financial and economic standards
associated with a privately owned electric operating utility.
The capital structure, total capitalization, and surplus ratios
contained in the financial and operating statements have been
carefully analyzed in order to determine the quality of an
operating company's securities from the standpoint of the
investor. However, outside of the work of the Federal Power
Commission, little has been accomplished statistically that
can be accurately substantiated with respect to an analysis of
the trends over the last decade of the various financial ratios
associated with the financial and operating statements of an
electric operating utility. Therefore, at this point in the
discussion a brief summary of the work of the authorities will
be given in relation to the analysis at hand.

1. Jordan

Of the standard investment texts reviewed, Jordan (1)
has provided the most complete analysis of electric operating
utility economic and financial standards. In the power company
analysis as presented, this authority indicates that the latest
balance sheet and income statement should be carefully analyzed.
Furthermore, experience indicates that a well-run company will
always report its financial operations within the limits of
the accepted financial standards. From an analysis of the
financial statements of many well-run, privately owned electric
operating utilities, the following standards concerning the
balance sheet accounts are:

1. The value of the assets shall not exceed five
   times the operating revenue in a steam plant
   and shall not exceed ten times the operating
   revenue for a hydro plant. The regulatory
   commissions, in establishing a fair rate of
   return for electric service, consider that
   the fixed assets shall represent about 90%
   of the total assets, and about 95% of the
   rate base.

2. The amount of outstanding bonds shall not ex-
   ceed 60% of the total securities outstanding
   and shall not exceed the value of the fixed
   assets by greater than 67%.

3. The depreciation reserve shall be equal to at
   least 10% of the value of the fixed assets.

(1) Jordan, David F., Jordan on Investments, 4th revised
    edition, Prentice-Hall, Inc., Chapter 21, Public Utility
    Securities, New York, 1941. pp. 363-365.

4. The outstanding amount of preferred stock shall not exceed 25% of all securities outstanding and shall at all times be less than the amount of common stock outstanding.

5. The outstanding amount of common stock shall be greater than 25% of all securities outstanding.

6. With regard to the surplus account, most utilities' balance sheets indicate only a small amount, in the light of the regulatory body's restriction on their earning power coupled with the fact that the utilities, in general, are unwilling to disclose what might be concluded to be excessive earning power.

Relative to these accounts associated with income statement, the economic standards are as follows:

1. The ratio of operating expenses, which includes provision for taxes, depreciation and maintenance, to operating revenues shall not exceed 70% for a steam generating plant and not more than 55% for a hydro generating plant.

2. The ratio of the operating profit before deductions for interest to the fixed investment shall be about 5 to 7% in order to represent a fair rate of return on the rate base.

3. The ratio of interest charges to operating revenues shall not be greater than 12% for a steam generating plant and shall not be greater than 20% for a hydro plant. The income available for interest charges shall be at least twice the requirement.

4. The ratio of the sum of the interest charges and preferred dividends to operating revenues shall not be greater than 20%. The total income available for interest charges and preferred dividends shall not be less than $1\frac{1}{2}$ times the total requirement.

5. The balance available for common stock dividends shall be at least 15% of the operating revenues.

6. The common stock should have a market value
    of about 12 times the earnings per share, or
    a value equal to the earnings capitalized at
    the rate of 8%.

2. Badger and Guthmann

Badger and Guthmann (1), in their more general
analysis of the economic and financial standards with respect
to operating electric utilities, pointed out that the quality
of the investment may be determined by the study of certain
significant ratios. The problem as it presents itself is not
unlike that which exists in certain industrial companies.
Operating conditions are sufficiently similar throughout the
field to allow for the use of a common denominator by which
the financial ratios of various companies may be reduced to
standard ratios for comparison.

One of the significant relationships, as used by
this authority with respect to the problem of ratio analysis,
concerns the comparison of capitalization and kilowatt capacity.
Other things being equal, it is evident that the lower the
capitalization of a given plant, the more favorable the situation
becomes.

According to Badger and Guthmann, Nash (2) stated
in 1931 that the cost of urban steam stations was likely to
average between $250 and $450 per kilowatt of rated generating

(1) Badger, R. E. and Guthmann, H. G., _Investment Analysis of
     Special Classes of Utilities_, Chapter XVI, p. 406.

(2) Nash, L. R., _The Economics of Public Utilities_, McGraw-
     Hill Book Co., New York, 1931, pp. 343-344.

capacity. The lower limit was approached in smaller cities where the electric system was reasonably compact and where the requirements for the underground distribution were simple. In larger cities and communities, where expensive underground transmission systems were required, the upper limit of $450 per kilowatt was reached. In localities requiring unusually complicated distribution systems, or in localities such as outlying territories where the population was small, the unit cost often exceeded the upper limit by a considerable margin.

The combined generating capacity of the private electric operating utilities at the end of 1937 was 34.5 million kilowatts, while the total investment in plant was 34.4 billion dollars. (1) The average capitalization per kilowatt of generating capacity was approximately $400. In 1947 the average capitalization per kilowatt of generating capacity had decreased to $310. (2)

Another factor of importance is the distribution of investment in plant assets between production and distribution facilities. In the average case it is accepted that the power plant investment should approximately equal the distribution investment. In other words, the average company should not be required to invest more than one dollar in distribution facilities for each dollar invested in station equipment.

(1) Federal Power Commission, Statistics of Electric Utilities in the United States, Washington, D. C., 1947, p. XVII.

(2) Ibid, p. XVII.

The capital investment of a power company may also
be reduced to a per customer and a per capita basis for the
purpose of ratio analysis by the process of dividing the
capital investment of the company by the number of customers
served and by the population of the area served. By comparing
the per capita investment with the per customer investment, it
is possible to measure plant utilization and the future devel-
opment of the company. However, care must be taken to consider
the demands placed upon the company by its customers, the man-
ner in which the load factor is affected and the amount to
which the diversity factor is upset.

With regard to the operating ratio, there appears to
be some difference between that of a steam station and that
of a hydro station. A ratio of from 40% to 60% is probably
normal for a hydro station. However, where the hydro station
sells its power in large wholesale blocks, the operating ratio
could be somewhat below the suggested limits. Steam stations
usually are associated with higher ratios ranging from 60%
to 70%, depending somewhat upon whether the company sells its
product at wholesale or retail. A steam power company selling
at wholesale will of course have the lower ratio. Hydro
generating plants seem to have, on the other hand, somewhat
higher capital investments and fixed charges than steam gener-
ating plants and likewise because of the increased capitalization
have, on the whole, higher percentages in bonds to total secur-
ities outstanding. The amount of bonds outstanding determines

the interest charges of the company. It is of great importance
in analyzing the investment status of an electric operating
utility to compare the interest charges with earnings available
for interest payments. Bonds on which interest charges have
not been earned at least two times are considered speculative.
Strong companies earn their interest charges $2\frac{1}{2}$ to 3 times.

The relation of the bonded debt to assets is closely
correlated with the safety factor of the bond as measured by
the earning capacity. This is true because in the utility
field close relationships exist between earning power and
assets.

Utility financing is not ordinarily regarded as con-
servative if the funded debt exceeds 60% of the total assets.
Stated in another way, the strongest electric operating
utilities are likely to show assets to debt equal to a ratio
of 2 to 1 and interest charges earned from $2\frac{1}{2}$ to 3 times.

Preferred stocks generally are not considered a con-
servative investment unless the preferred dividend requirements
are earned at least two times, or probably more in an electric
operating utility. Because of the rarity of this situation,
most utility preferred stocks are considered of second grade
quality.

There is another method of determining the earnings
of the common equity, by relating the per share earnings of
the common equity to the prevailing market price. Unless the

common equity is influenced by special considerations, such
as a merger of the company with another, the market price of
the common equity should indicate a value of 12 to 18 times
the earnings of the common equity after depreciation reserves
have been subtracted, or a value equal to the earnings capit-
alized at the rate of 8 to $6\frac{1}{2}\%$. Although it is true that
asset values are important in determining the value of the
securities of public utilities, earning power is generally
the dominant factor affecting the value of these securities
and must be given primary attention. For example, in studying
the variations of net earnings of a corporation's common
stock, the influence of the capital structure should be recog-
nized. The heavier the bonded debt of the corporation, the
larger its fixed charges. Where a corporation is financed
largely by means of funded debt, or funded debt and preferred
stock, leaving only a small residue of capitalization repre-
sented by common stock, a slight drop in gross revenues, or
a small increase in operating expenses, tends greatly to reduce
the per share earnings and, other things being equal, to de-
crease the ratio of the market price of the common stock to
earnings of the common stock. Conversely, a slight increase
in gross revenues, or a slight decrease in operating expense
tends greatly to increase the per share earnings of the common
stock and in turn the price earnings ratio. For this reason
the common stocks of corporations, particularly the holding
companies with a proportionately heavy funded debt, offer

opportunities for greater profits. On the other hand, however, they should be considered more speculative in the light of the equal chances for losses as well as gains in profit. Usually the common stock of operating companies will normally sell at a price of 12 to 18 times earnings per share before depreciation. Although earning power is the dominant factor, and although assets are of little worth to the investor if there is no income, nevertheless the actual asset value behind utility securities is an important matter. A utility is allowed by the commissions to earn a reasonable rate of return on the sound value of its assets, so that if securities are outstanding in conservative relation to the property, they should at least theoretically be well protected by earnings.

3. Childs and Woodbridge

Childs and Woodbridge (1) approached the problem of ratio analysis associated with the various types of utilities as follows. With regard to the earnings statement, this authority stresses the computation of a few simple ratios from the income accounts. Having computed these ratios, it is concluded that the major part remaining in the analysis consists of assaying their reliability and significance in forecasting any possible major change that might occur in the value of these ratios in the future.

(1) Childs, John F. and Woodbridge, Francis, A Practical Introduction to Public Utility Security Analysis, Barron's Publishing Co., Inc., New York, 1940, Chapter I, p. 1.

4. Grossman

Grossman (1) referred to only three ratios considered
to be significant in the matter of financial standards associ-
ated with an electric operating utility. The ratio of funded
debt to net property indicates the amount by which the debt is
covered by the fixed assets and is generally considered con-
servative at a value of about 60%. The second ratio of im-
portance is the operating ratio. An operating ratio of be-
tween 60% and 70% is common for steam electric plants, while
hydroelectric properties exhibit an operating ratio below 50%.

The third and final ratio discussed is the ratio of
depreciation to gross operating revenues. Charges made at a
rate greater or less than the range of 7% to 10% should be
subject to close scrutiny.

<h2 style="text-align:center">G. SUMMARY</h2>

In summarizing the information contained in the
standard investment texts relative to the evaluation of the
various financial and economic standards associated with the
privately owned electric operating utilities, it is concluded
that although these authorities varied in degree of complete-
ness of analysis, they were fairly well in agreement relative
to the establishment of comparable values for each ratio dis-
cussed.

(1) Grossman, Leroy W., M.B.A., Investment Principles and Prac-
tices, Longmans, Green and Co., New York, 1939, Chapt. XV,
pp. 167-170.

However, little was said with regard to the impor-
tance of trends. The purchaser of a security may be interested
in market stability, in income, or in capital gains, but in
any case he is interested in security analysis where it pro-
vides a clue to the future. Trend analysis of certain figures,
such as debt, revenues, costs and income, is an aid in ex-
plaining the industry's present financial position and thus
throws light on its prospects for the future.

In the following chapters where general figures
regarding the industry have been given, an effort has been
made to use those which are based on the Federal Power Com-
mission's uniform system of accounts; but in certain instances,
it was impossible to do so as not all the industry figures are
compiled on the same basis.

Therefore an attempt is made in this study to deter-
mine, within practical limits, the present and future financial
position of the private electric operating utility industry by
means of a statistical trend analysis of certain financial
standards associated with the balance sheet and income state-
ment. The results of these statistical analyses are used to
point up the implications of the industry's financial position
in the light of current financial conditions.

CHAPTER II

THE CAPITAL STRUCTURE RATIOS

A. GENERAL COMMENTS

The concept of a balanced, or optimum, capital
structure is basic to security control. The proportions be-
tween debt and stock issues determine in part the costs of
capital, the possibility of receivership and the relationship
of capitalization to consumer rates. In the light of increased
load demands over the last decade, and in the future, the in-
dustry is faced with the problem of how to finance the present
and future capital requirements and, at the same time, pre-
dict as accurately as possible what the effect will be with re-
gard to the present capital structure ratios. The commissions
and the public, both from the standpoint of service and of
investment, are vitally concerned with the problem. As long
as the utilities remain in the category of private enterprise,
capital will have to be raised in the competitive security
markets and the utilities must vie with other opportunities
for investment presented at home and abroad by public and by
private institutions and enterprises. Electric utilities can
attract that capital only on the promise of earning an ade-
quate return for the public as an investor. The public, from
the standpoint of service, are demanding more electric service.
At the same time plant output has reached its peak in the
majority of electric operating utilities and new capital is
needed for additional plant capacity and extensions.

The available data (1) indicate that the industry will have spent about 3.4 billion dollars for new plant in the three years 1944 to 1947. To finance this volume of capital expenditures, the industry had available from internal sources approximately 1.7 billion dollars of which 1.3 billion came from depreciation, amortization, and working capital and 400 million came from industrial profits. Cash generated from internal sources was inadequate to wholly finance this construction program. Hence the industry raised the remaining 1.7 billions from the sale of securities. Of this total 1.3 billion dollars came from the sale of bonds, about 200 million from the sale of preferred stock, and a like amount from the sale of common stock. Therefore approximately 75% of the new money obtained by the industry from the security markets during these three years was derived from the sale of debt securities and 25% from the sale of preferred and common stocks.

Utilities must depend upon new money for the extensions of property. Invested funds that do not provide adequate returns in the light of the factors of risk, seriously impair the chances of acquiring new funds in the capital market. Refunds of bonds and preferred stocks on the part of the electric operating utility industry have been practically completed. Federal excess profit taxes have been decreased to a point where further savings from this source cannot be applied

(1) Federal Power Commission, Statistics of Electric Utilities in the United States, Washington, D. C., 1947, pp.XVII-XVIII.

as increased contributions to net income. With the tremen-
dous increases in other taxes and operating expenses due to
the rising cost of labor and materials, an upward adjustment
in rates may become one of the most important sources of re-
lief.

B. STATEMENT OF THE PROBLEM

To accomplish the purpose of this study, it is
necessary to divide the material contained in this chapter
into two parts. The first part deals with the statistical
trend analyses of each ratio. The second part is concerned
with the results of these analyses with regard to the entire
utility financial problem.

C. DESCRIPTION OF THE STATISTICAL METHODS EMPLOYED

The statistical trend analysis for each ratio is
based upon data taken from a publication of the Federal Power
Commission, Washington, D. C., known as "The Statistics of
Electric Utilities in the United States, Classes A and B
Privately Owned Companies." The publication has been pub-
lished yearly for eleven consecutive years (1936 to 1947)
and has presented comprehensive financial and operating in-
formation on every important privately owned electric utility
in the United States. This information was taken from the
annual reports of Class A and Class B privately owned electric
utilities submitted to the Federal Power Commission for each
year analyzed herein. Class A and Class B electric utilities

are those which had annual electric revenues of $250,000 or more and who were required by the Commission to conform to the uniform system of accounts adopted June 16, 1936.

The uniform system of accounts was promulgated by the Commission, following the approval of the Federal Power Act of 1935, in order to correct accounting and financial operations which adversely affected the investor and consumer. Thus practically all of the electric utilities in the United States, whether their operations were interstate or intrastate, kept books on essentially the same accounting basis and made uniform reports of finances and operations. It is estimated that at present in excess of 90% (1) of the electric utility industry, on the basis of assets, is required to conform to these accounting procedures. Likewise, the data presented concerning the capital structure ratios analyzed are based upon statements of accounts and statistics submitted to the Commission and concern the accounts and statistics of individual operating companies only.

D. DEFINITION OF TERMS CONTAINED

The statistical treatment contained in this chapter includes a time series analysis of the component elements of the total outstanding securities--bonds outstanding, preferred stock outstanding, preferred stock plus common stock outstanding,

(1) Federal Power Commission, A Financial Record of the Electric Utility Industry, Washington, D. C., 1937-1945, p. 2.

and common stock outstanding, each expressed in per cent of
the outstanding securities of the private operating electric
utility industry. Each of these elements is expressed in the
form of a ratio in per cent of the total outstanding secur-
ities. The outstanding securities are expressed in billions
of dollars.

1. Bonds Outstanding and Total Securities Outstanding

The term "bonds outstanding" used in this study
does not include debentures, receivers' certificates, advances
from associated companies, and miscellaneous long-term debts.
The term "total outstanding securities" includes common stock,
preferred stock, premiums and assessments on capital stock,
bonds and other long-term debt outstanding.

2. Common Stock and Preferred Stock Outstanding

The terms "preferred stock outstanding" and "common
stock outstanding" include only the preferred and common stock
outstanding respectively. These terms relate to the strict
financial definition of preferred and common stocks associated
with the financing of the long-term capital requirements of
any corporation. Common and preferred stocks both represent
ownership in the corporation but differ with regard to their
respective rights and privileges.

3. Standard Deviation

The term "standard deviation" used in this chapter
is a pure statistical term. Standard deviation is the extent

to which the data varies from the arithmetic averages over
the period studied. It is defined as the root-mean-square
deviation (1) about the arithmetic mean of the data.

4. Logarithms

The term "logarithms" referred to in this chapter
is the common or Briggs Logarithms which are logarithms to
the base 10. That is, if natural numbers are regarded as
powers of 10, the exponents of the powers are the logarithms
of the numbers.

E. THE STATISTICAL TREND ANALYSES

Figure I, page 23, shows the trend of total secur-
ities outstanding in dollars, common stock outstanding to
total securities outstanding, and bonds outstanding to total
securities outstanding in per cent. For the purposes of the
trend analysis, each of the quantities shown in Figure I are
expressed in terms of their standard deviations. It is there-
fore possible to compare the trend of the dollar values of
total securities outstanding with the percentage values of
each ratio because each quantity is stated in terms of a
normal for the period analyzed.

1. Total Securities Outstanding

Total securities outstanding (Figure I) as of 1937,
following a slight increase in 1938, exhibits a nearly constant

(1) Riggleman, J. R. and Frisbee, I. N., Business Statistics,
     2nd Edition, McGraw-Hill Book Co., New York and London,
     1938, p. 219.

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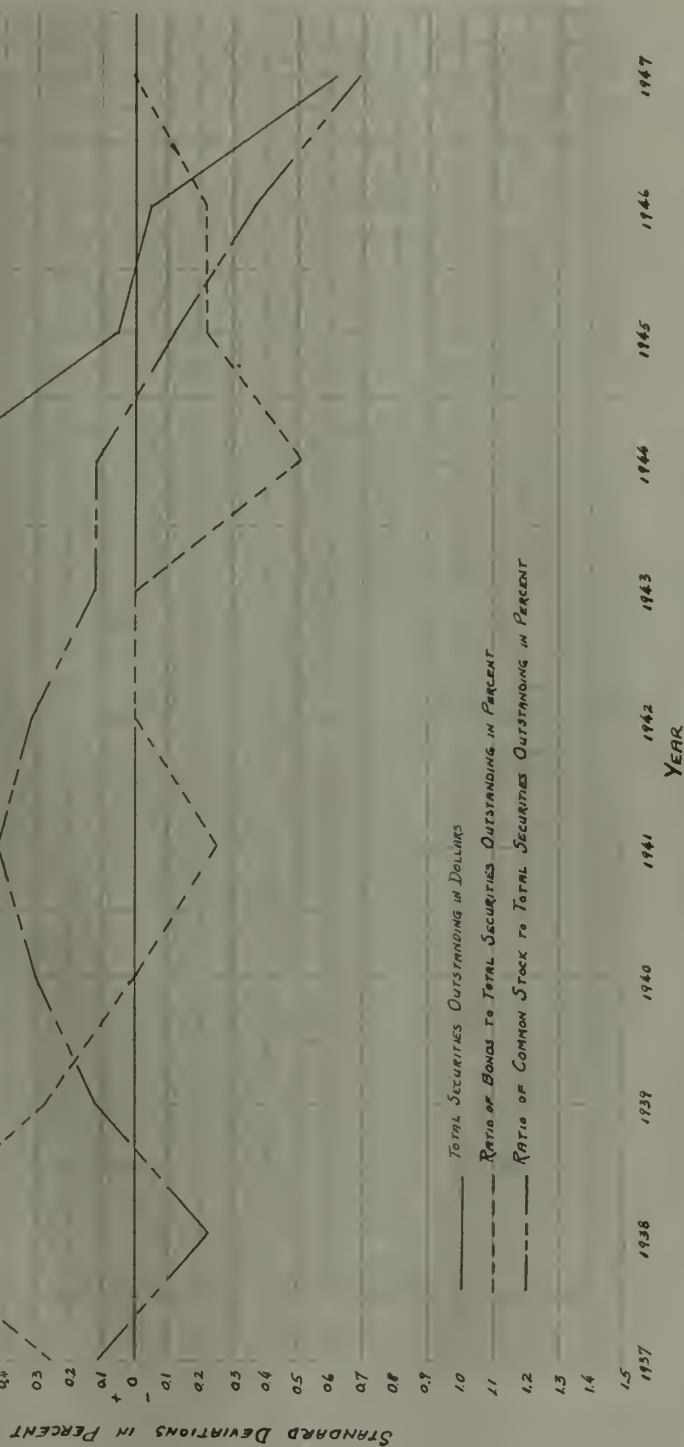
Fig 1 - Comparison of Trends of Selected Capital Structure Ratios For The Private Electric Operating Utility Industry in Terms of Their Standard Deviations From Normal 1937-1947
Source - Federal Power Commission, Washington D.C., Statistics of Electric Utilities in the United States 1937-1947

trend up to 1941. From 1941 to 1947 a sharply decreasing trend is evident. In actual dollar figures, total securities outstanding decreased about 5% from the 1937 figures.

The logarithmic curve in Figure 2, page 25, shows the rate of growth in the trend of total securities outstanding which is essentially constant from 1937 to 1942. After 1942 the rate of growth in the trend increases quite rapidly until 1945 where it levels off to increase again at a slightly greater rate through the year 1947.

Many influences combined to produce these results. An important influence was felt in the action of the commissions with regard to the forced adoption by the industry of the uniform system of accounts. The reduction in total securities outstanding during the period 1942 to 1945 was mostly at the expense of bond retirement, restatement of plant accounts in order to reflect the actual legitimate investment allowed by the commissions, and common stocks.

Bonds outstanding from 1937 to 1945 decreased about 11%; and in spite of large additions to plant, the plant investment at the end of 1945 was 5% less than the 1937 figure reflecting the results of the elimination of inflation. Common stock was reduced during this same period about 11.5%, while preferred stocks remained essentially the same.

The increase in the value of total securities outstanding after 1945, which does not appear in the trend of

25
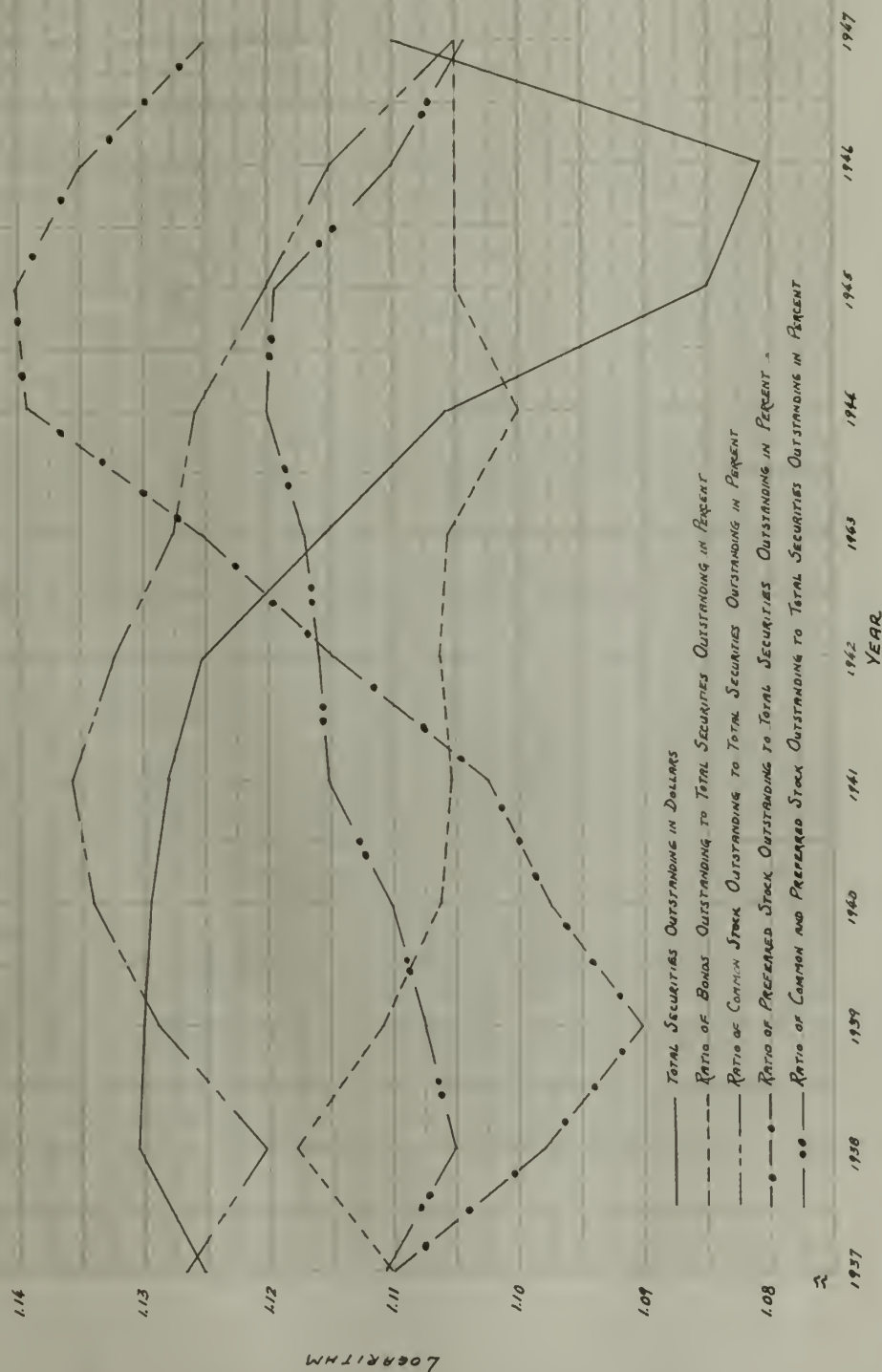
FIG. 2- COMPARISON OF THE RATES OF GROWTH OF SELECTED CAPITAL STRUCTURE RATIOS FOR THE PRIVATE ELECTRIC OPERATING UTILITY INDUSTRY 1937-1947

SOURCE - FEDERAL POWER COMMISSION, WASHINGTON, D.C. STATISTICS OF ELECTRIC UTILITIES IN THE U.S. 1937-1947

this account shown in Figure I, page 23, but which appears in
Figure 2, page 25, is the affect of the expenditures by the
industry for new plant for the 1944 to 1947 period which
amounted to 3.4 billion dollars.

2. The Relation of Common Stocks and Bonds

        In the case of the common stock outstanding to
total securities outstanding, the bonds outstanding to total
securities outstanding, as presented in Figure I, page 23, it
is evident that the trends of these two ratios are in opposite
relation to one another beginning in 1937 and continuing
through 1947. The points of intersection occurring between
the trends of these two ratios in the first three months of
1939 almost occurs again in 1943. In 1945, however, an inter-
section between the two trends is finally effected, but at
a point below that of the 1939 intersection. The lowering of
the 1945 intersection from the 1939 occurrence is considered
to be caused by the effect of the decreasing amount of total
securities outstanding, the decreasing trend of which is re-
flected to a proportionate degree in the trends of common
stock outstanding to total securities outstanding and bonds
outstanding to total securities outstanding. It is further
assumed that the reason for the opposite relations of the
trend of these two curves (see Figure I, page 23) is affected
by the mathematics of the problem of capital finance. When
the managers of the companies consider that financing by means

of debt securities is the most optimum method to employ,
common stock financing must of necessity suffer. On the other
hand, when common stock financing is the most optimum method
to employ in order to satisfy the capital needs of the com-
panies, debt financing is reduced accordingly.

A study of Figure 2, page 25, reveals the significant
fact that, since 1941, the rate of growth of the ratio of bonds
outstanding to total securities outstanding is essentially con-
stant. On the other hand, the rate of growth of the ratio of
common stock outstanding to total securities outstanding during
the same period is decreasing, therefore indicating the ten-
dency of the management of the industry to use debt securities
rather than common stocks to provide the necessary capital re-
quirements. It is understandable that this trend which con-
tinued during World War II because of the attraction of extra-
ordinarily low interest rates, together with the savings re-
sulting from tax credits, will be continued by management in
the light of anticipated higher earnings available to the
remaining common stock outstanding. It is interesting to note
that dollar amounts of common stock outstanding for the per-
iod decreased approximately 9.3% while bonds outstanding de-
creased approximately 4.7%.

3. Preferred Stock

The ratio of preferred stock to total securities,
shown in Figure 3, page 28, shows a decreasing trend from 1937
to 1939 when an increasing trend is noted. This increasing

28
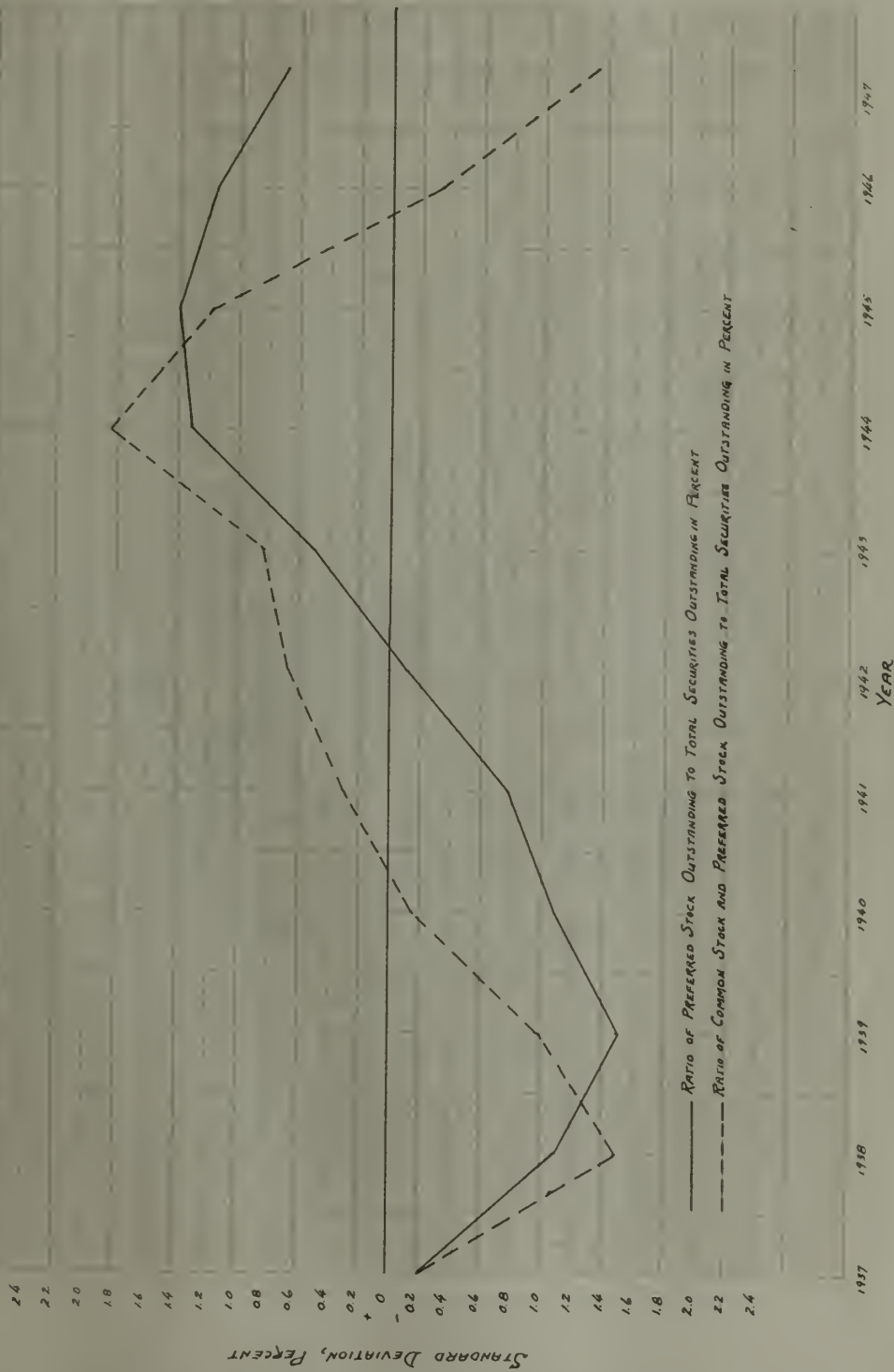
FIG. 3.—COMPARISON OF TRENDS OF SELECTED CAPITAL STRUCTURE RATIOS FOR THE PRIVATE ELECTRIC OPERATING UTILITY INDUSTRY IN TERMS OF THEIR STANDARD DEVIATIONS FROM NORMAL 1937-1947

SOURCE—FEDERAL POWER COMMISSION, WASHINGTON, D.C. STATISTICS OF ELECTRIC UTILITIES IN THE U.S. 1937-1947

trend in the ratio after 1939 continued uninterrupted until 1945 when it decreased again. Figure 3 also indicates a decline in the average values of the ratio after 1945 to a point where they are nearly equal to the average values at the beginning of the cycle in 1937.

The rate of growth of the ratio, as shown in Figure 2, page 25, is quite erratic for the period. Beginning in 1937 the rate of growth of the ratio of preferred stock to total securities outstanding decreased quite sharply until 1939 when it began to increase in the opposite direction with about the same rate until 1941. From 1941 to 1945 where a peak is reached, the rate of growth of the ratio increased with even greater impetus. After 1945 the rate of growth decreased again at about the same rate as it was decreasing in the 1937 to 1939 period.

The fluctuations in the trend values and rate of growth of the trend of the ratio of preferred stock to total securities outstanding shown in Figures 2 and 3 follow the pattern of a sine wave (1) to some extent. The area included under the curve for the negative half-cycle is approximately equal to the area included under the positive half-cycle of the curve. This suggests that, although the fluctuations in the trend values and the rate of growth of the trend values for the ratio are quite erratic in their movements over the

(1) A sine wave is defined as a time series whose instantaneous ordinates vary with the sine of the angle of time.

period, the normal for the ratio is about the same in 1947
as it was in 1937. In dollar figures the value of the pre-
ferred stock outstanding decreased about .2% for the period.
It is deduced further that the sine-wave pattern assumed by
the ratio of preferred stock outstanding to total securities
outstanding for the period was caused by the refinancing
methods employed by the managers of the industry. One of the
outstanding financial phenomena of the last decade has been
a steady and prolonged decline in interest rates. As a re-
sult there has occurred within the industry an unusually
large volume of refinancing of bonds and preferred stock in
order to reduce the costs of capital. Likewise, the greater
volumes in the refinancing of preferred stock issues by the
industry occurred in the period of 1941 to 1945 inclusive
indicating the effect of the war. Figures 2 and 3 reflect
management's efforts to cooperate with the Federal Government
in the matter of controlling inflation by means of reductions
in interest rates on outstanding obligations. Requests for
rate increases were also precluded because of the more effi-
cient use of the savings effected from the refinancing processes
and from income tax reductions.

4. The Relation of Common Stock and Preferred Stock to Total
Securities Outstanding

The ratio of common stock plus preferred stock out-
standing to total securities outstanding in Figure 3, page 28,

follows very closely the fluctuations in the trend values of
the ratio of preferred stock outstanding to total securities
outstanding for the period. Likewise, the rate of growth of
the two ratios are approximately the same and occur at about
the same time except that the time phase of the ratio of
common stock plus preferred stock outstanding to total secur-
ities outstanding leads the time phase of the ratio of pre-
ferred stock outstanding to total securities outstanding by
almost a year throughout the period. The reason for this
phase difference between the two ratios portrayed in Figure 3
is considered to be caused by the mathematical combination
of the two ratios. The much greater fluctuations both in
the trend values and the rate of growth of the ratio of pre-
ferred stock outstanding to total securities outstanding,
when combined with the ratio of common stock outstanding to
total securities outstanding, produce a composite curve of
the ratio of common stock plus preferred stock outstanding
to total securities outstanding quite similar in form to that
of preferred stock outstanding to total securities outstanding.
A more important point of consideration is the fact that the
average ratio of bonded debt to total outstanding securities
is approximately equal to the average ratio of the total
capital stock outstanding to total securities outstanding.
This fact reflects the ideal capitalization ratios (1) of

(1) Jordan, David F., Jordan on Investments, 4th Revised
     Edition, Prentice-Hall, Inc., New York, 1941, Chapt. 21,
     p. 364.

50% debt securities and 50% capital stock of the total securities outstanding. The dollar figure for common plus preferred stock outstanding decreased about 6% for the period analyzed.

F. CONCLUSIONS OF THE TREND ANALYSIS

It is concluded from an analysis of the trends of the capital structure ratios contained in this chapter that, in general, although the dollar values of the bonds outstanding and capital stocks outstanding have decreased from 1937 to 1947 inclusive, the value of total securities outstanding has likewise decreased in about the same proportion. The value of the total outstanding securities is the base from which each ratio was computed. Therefore, the trend of the mathematical base is reflected in each percentage computed from that base, and also in each of the ratios computed. In Table I, page 33, this fact is further confirmed by the action of the percentage values of each ratio for each year which remain almost the same over the whole period. The arithmetic ave age for each ratio is considered as the "normal" for each ratio over the period analyzed.

The trend of the total securities outstanding, as previously indicated, is downward. Particularly is this true since 1942. In 1947 there are still no indications from the curves in Figures I and 2 that the downward trend has been interrupted. However, Figure 2 indicates that the rate of decrease in the growth of total securities has been reduced

TABLE I

THE VALUES OF SELECTED CAPITAL STRUCTURE RATIOS

FOR THE PRIVATE ELECTRIC OPERATING

UTILITY INDUSTRY 1937-1947

(Expressed in Percent)

Year	Bonds Tot. Sec.	Com. Stock Tot. Sec.	Pref. Stock Tot. Sec.	Com. & Pref. Stock Tot. Sec.
1937	48.0%	32.2%	15.9%	48.0%
1938	48.6	31.6	15.4	47.2
1939	48.0	32.2	15.2	47.5
1940	47.6	32.6	15.4	48.0
1941	47.4	32.8	15.6	48.3
1942	47.6	32.6	16.0	48.5
1943	47.6	32.2	16.4	48.6
1944	46.9	32.2	16.9	49.2
1945	47.3	31.8	17.0	48.8
1946	47.3	31.3	16.8	48.0
1947	47.6	30.7	16.5	47.3
Arith. Avg.	47.6%	32.0%	16.1%	48.1%

(Chart in Billions of Dollars)

Source: Federal Power Commission, Statistics of Electric Utilities in the United States, Washington, D. C., 1937-1947.

very sharply for the year 1947. The influences of regula-
tory action on this account--namely, the "Holding Company Act
of 1935" and the imposed use of the uniform system of accounts
--contributed greatly towards the reduction of inflationary
items and the proper operation of sinking funds. However,
the decreasing rate in the downward trend during 1947 of total
securities outstanding indicates that in dollar values this
account has begun to increase again.

The trend of the ratio of bonds outstanding to total
securities outstanding, although on the decrease since 1941,
in 1944 starts to rise again. The rate of this rising trend
after 1944 appears to be increasing somewhat less than the
rates at which the ratios of common stock outstanding and
preferred stock outstanding to total securities outstanding
are decreasing. In dollar values bonds outstanding indicate
a 4.7% decrease, and total securities outstanding approxi-
mately the same decrease over the period analyzed. The
dollar value of preferred stock remained almost the same at
a .5% decrease and the common stock decreased 11.5%. There-
fore the electric ope ating utilities over the last decade
have, in general, reduced the aggregate of the securities
outstanding. This reduction was accomplished by means of
adequate sinking funds and through the operation of proper
depreciation reserves. It was, in other words, accomplished
mostly at the expense of bonds and common stock retirement.
However, since 1946 the ratio of bonds outstanding to total

securities outstanding has increased, reflecting the impor-
tance that debt securities will have in financing the future
expansion program.

The ratio of preferred stock outstanding to total
securities is concluded to have remained approximately the
same over the decade. If the effect of the trend of total
securities outstanding was removed, this ratio might well
have increased.

The ratio of common stock outstanding to total secur-
ities outstanding indicates a marked decrease in amplitude for
the decade. If the trend of total securities outstanding
were subtracted from the percentage decrease in the dollar
value of common stock outstanding over the decade, the result
would have indicated a still further decrease in value other
than that shown by the curves in Figures I and 2. These facts
further implied that use of common stock as a means of raising
new capital for the industry has become less favorable as
time has gone on.

It is further concluded that the ideal capital struc-
ture ratios of 50% debt securities and 50% capital stocks have
been maintained throughout the decade. Table I, page 33,
clearly proves this point. Likewise the ratio of common stock
outstanding to total securities outstanding has been maintained
at 7% above its respective ideal ratio. On the other hand,
the ratio of preferred stock outstanding to total securities
outstanding has been maintained at approximately 9% below its

respective ideal ratio. These facts indicate that the pri-
vate electric operating utilities have maintained over the
last decade the record of consistent improvement to their
basic financial soundness. Furthermore, it also confirms
the conclusions of Jordan (1), who maintained that, with
respect to the balance sheet, the amount of bonds outstanding
should not exceed 60% of all the securities outstanding; that
the preferred stock outstanding should not exceed 25% of all
securities and should be less than the amount of the common
stock; and that the common stock outstanding should represent
at least 25% of all securities outstanding.

G. IMPLICATIONS OF THE TREND ANALYSIS IN THE
LIGHT OF THE CURRENT UTILITY FINANCIAL PROBLEM

The second part of this chapter concerns the impli-
cations of the results of the statistical analyses of each
ratio in the light of the current utility financial problem.

The concept of a balanced or optimum capital struc-
ture is basic to security control. In the light of increased
load demands over the last decade, shown in Figure 4, page 37,
the industry is faced with the problem of how to finance the
present and future capital requirements and at the same time
predict as accurately as possible what the effect will be
relative to the present capital structure ratios. The

(1) Loc. cit.

37
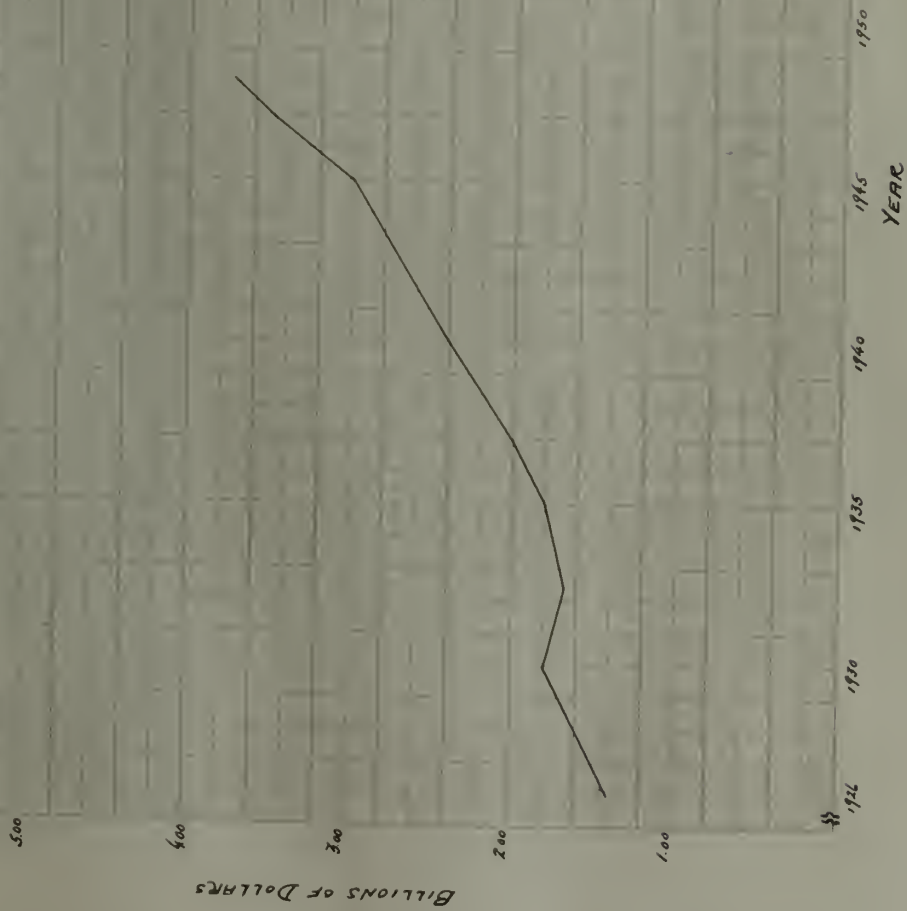
F.G. 6 — Gross Revenues of the Private Electric Operating Utility Industry in Billions of Dollars 1926-1947
Source- Statistics of the National City Bank of New York, New York City, N.Y. June, 1948

commissions and the public, both from the standpoint of ser-
vice and investment, are vitally concerned with this problem.

One of the most important influences exerted upon
the capital structure ratios of the electric operating util-
ity industry is the matter of increased electric load. In-
creased load should have required increased plant which, in
turn, should have had an effect on the capital structures.
It is found, however, that over the last decade the capital
structure ratios analyzed did not change materially. By
means of interconnection facilities between companies, greater
utilization of plants and the expenditure of about 3.4 billions
of dollars for new plant between 1944 and 1947, the load in-
crease, which amounted to approximately 150% over the period
from 1926 to 1947 inclusive, was accounted for. Figure 4
also indicates the great stability of revenues of the electric
utility industry over the period. This was true not only
during the great depression of the 1930's, but also in the
minor recession of 1938 and the temporary reconversion slump
after the end of World War II.

Figure 5, page 39, illustrates another portion of
the current utility financial picture that is directly related
to earnings, namely, the heavy expenditures now being required
for the expansion of plant and equipment. Figure 5 also indi-
cates that the annual depreciation charges represent an inter-
nal source of funds which is substantial and steadily rising,
yet is only a small fraction of the total supply of capital
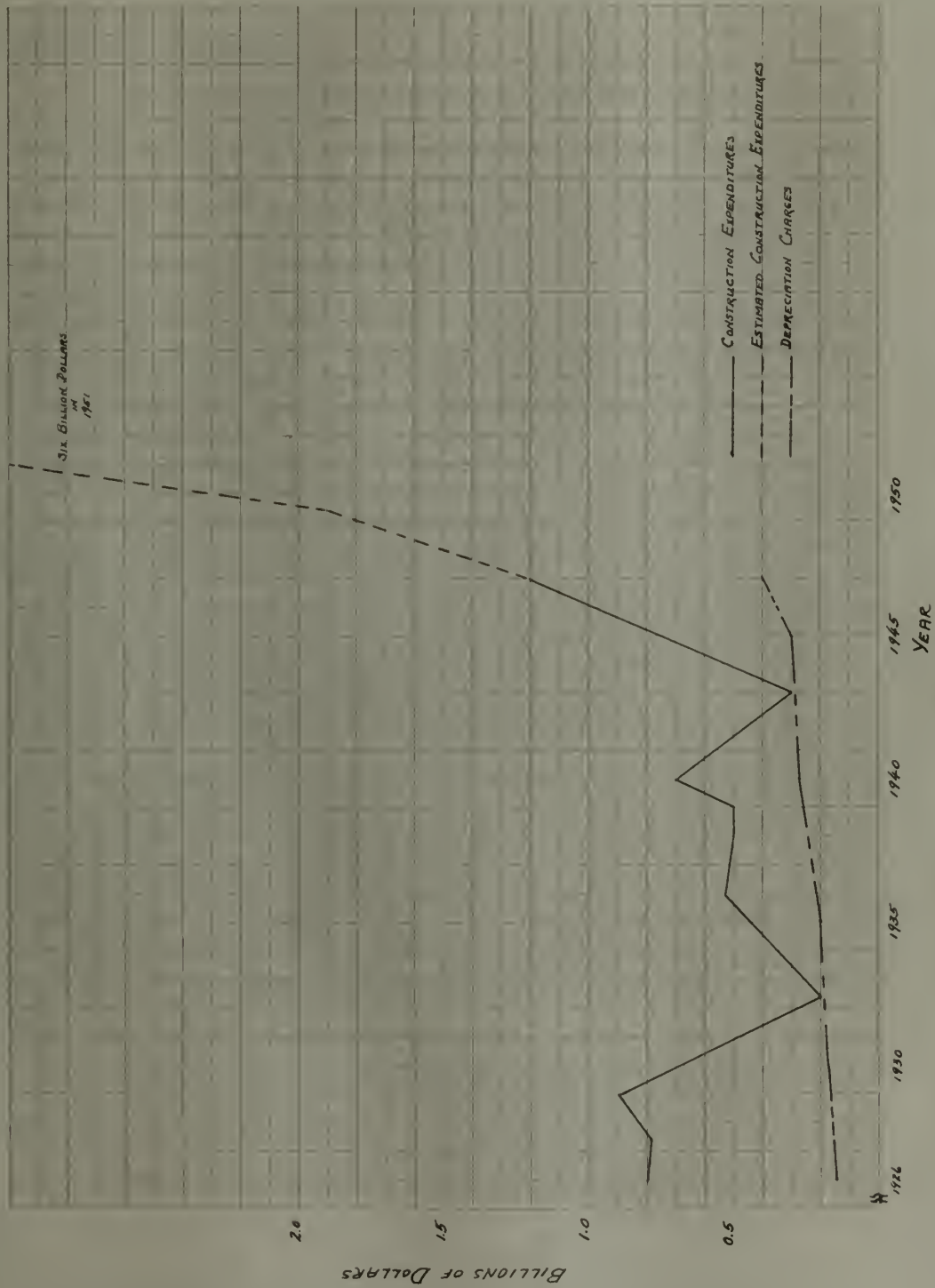
FIG. 5 — Comparison of Construction Expenditures and Depreciation Charges for the Private Electric Operating Utility Industry in Billions of Dollars 1926-1947

Source- Statistics of the National City Bank, New York City, N.Y. June 2, 1948

needed to finance the new expenditures at the current rate.

1. Electric Utilities Expenditures for New Construction vs. Depreciation Charges

An analysis of Figure 5 further reveals that during the period of 1926 to 1930 expenditures for new construction averaged about 800 million dollars annually. In 1947 expenditures for new construction averaged almost 1.3 billion. The curve was then projected to 1948 where it was estimated that the new construction charges will be approximately 1.8 billion dollars.

As previously stated, the available data indicate that the industry will have spent about 3.4 billion dollars for new plant during the years 1944 to 1947. Figure 5, page 39, further confirms the previous statement that in order to finance the volume of capital expenditures of 3.4 billion dollars, 1.7 billions were available from internal sources and the remaining 1.7 billions were raised from the sale of securities of which 75% was derived from the sale of debt securities, and 25% from the sale of preferred and common stocks.

Therefore the industry, during the three-year period, was obliged to go to the banks and to the security market for more than half of the money it needed in order to finance the volume of capital expenditures required.

2. The Capital Structure Problem--the Cost of Capital

As long as the utilities remain in the category of

private industry, new capital must be raised in the competitive markets and the utilities must compete with the other investment opportunities offered by public and private institutions. However, the utilities can attract that capital only on the promise that they afford an adequate return to the investor.

The industry in 1947 sold high-grade promises and preferred stocks to the practically tax-exempt insurance companies where the only market competition was from artificially supported Government bonds which yielded approximately $2\frac{1}{2}\%$. The insurance companies were found to have between 2.5 to 3 billion dollars (1) in funds available for investment. This figure is large in relation to the annual new capital needs of the electric utilities just described for the period 1944 to 1947. Therefore it is evident that the utilities can expect to extract new capital from the life insurance companies as long as the utility earning power and equity values are adequate enough to provide protection to long-term credit issued by these investment institutions. The problem of maintaining a balanced capital structure with growth appears to be a job that must be settled by each company by means of an analysis of the capital structures in order to properly determine the amount of new equity capital required. Likewise, analysis of particular companies should determine to a large

(1) Public Utilities Fortnightly, Survey of Current Business 1948 as Reported by 36 Life Insurance Companies, U. S. Dept. of Commerce, Washington, D. C., Nov. 18, 1948, p. 711.

degree what rate increases are needed to attract the necessary capital to the industry which from the standpoint of the public and the investor probably needs additional financial strength. It is assumed that the consumer has a right to good electric service and that the regulatory process is designed to work to provide that end. It is also assumed that the consumers' needs can only be properly served by means of a strong industry that is able to exist and at any time be expanded to meet those needs. Then, in summation, it is concluded that the earnings requirements of the electric utility industry have to measure up to market requirements whenever new capital is needed.

3. Rate Adjustments and Commission Regulation

Stathas (1) pointed out that many operating electric companies do not need rate relief at the present time. However, those who have been earning subnormal rates of return have been surprisingly successful in obtaining rate increases from the regulatory authorities. Following are a few examples of those operating companies that have been successful: Detroit Edison Company, California Electric Power, Atlantic City Electric, Potomac Electric Power, Central Maine Power Company, Brockton Edison Company, Virginia Electric and Power, and Cincinnati Electric Company. These facts provide

(1) Stathas, P. P., The Utility Industry Outlook, The Commercial and Financial Chronicle, October 21, 1948, p. 3.

evidence that probably the regulatory commissions have recog-
nized that regulation is a give-and-take proposition. They
will undboutedly cooperate with the industry in order to
keep the capital structures of the industry on a sound basis,
thereby enabling it to furnish the type of service required
to properly satisfy the customer.

H. CONCLUSIONS

It is of note that in spite of the sizable property
additions made between 1940 and 1947, as shown in Figure 5,
page 39, the capitalization ratios, and particularly the
position of the senior securities, have not changed materially.
For instance, the bonds outstanding were equivalent to 47.6%
of the total securities outstanding with preferred stock
accounting for 15.4%, and the common stock equity and surplus
representing 37%. The corresponding figures at the end of
1947 were 47.6% for the bonds outstanding, 16.5% for the pre-
ferred stock, and 35.9% for the common stock equity and sur-
plus. Therefore the bonded debt indicated practically no
decline, the preferred stock component was increased only
slightly, and the common stock equity and surplus decreased
but a small amount.

It also appeared that, as of December 1947, there
have been only small fluctuations in the components of the
capital structures ratios associated with the privately
owned electric utilities since 1940. This fact is exceedingly

important in the light of the current problem; for the period 1940-1947 was a period of high construction expenditures on the part of this class of utility, as indicated by Figure 5, page 39, and the trend analysis section of this chapter. In other words, it is evident that the capital structure ratios have not changed materially over the decade analyzed.

The results of the analyses indicated that it was possible that the so-called ideal capital structures of 50%, 25% and 25% may not be the proper solution to the problem. The characteristics of the territory served by a given company were found to be important factors, particularly with respect to the type of load served and the influence upon such load of the variations of load factor (1) which have to be taken into account. A company which has served a stable territory could well stand a higher debt ratio than one which is subject to wide fluctuations. Companies which have had earnings that have insured higher coverages for debt could probably justify a higher debt to start with. Also, an initially higher debt ratio associated with large sinking funds might be a better solution to the problem than the ideal capitalization ratios mentioned previously.

It is likewise concluded, in more or less the same vein, that a higher proportion of interest-bearing securities

(1) Load factor here means the ratio of average gross sales to peak gross sales, usually expressed in kilowatt hours.

could result in tax savings at the present high-level income
tax rates and these savings, together with additional re-
tained earnings, could help pay off the debt faster, thereby
working to a better advantage than having a lower debt ratio
and a higher proportion of preferred stock, particularly in
times when preferred stock, as well as common, are hard to
sell.

Also regulatory commissions should take a more
flexible and liberal attitude towards capitalization ratios
generally. From the investors' standpoint, especially the
institutional investor, emphasis should be placed upon the
fact that the companies' senior securities do not change in
respect to the total capital structure. The last safeguard
for this class of investor would be adequate cash sinking
funds and protective provisions in the indentures whereby
the initial position of the senior issues and preferred
stocks will improve as time goes by. It is by these means
that the senior security investor has a chance of getting a
part of his invested funds returned before the time of
maturity.

CHAPTER III

TOTAL CAPITALIZATION AND SURPLUS RATIOS

A. GENERAL COMMENTS

The problem of total capitalization associated with
the private electric operating utility industry is unquestion-
ably bound up with the problem of the rate structure. The
question of the value of the actual costs of construction and
the costs of reproduction of property has been argued by the
courts, the commissions and the industry in a most contro-
versial manner. The valuation problem has, therefore, assumed
an aspect of considerable importance not only to the public,
but also to the investor in public utility enterprises since
the particular valuation allowed by the commissions was a
very important determinant of the rates that would be per-
mitted and of the earning power of the industry itself. A
fair rate of return was considered to be one which would allow
a proper return on the fair value of the property employed
for the public benefit.

Rate changes have been put into effect only after
commission approval. Likewise, the rates have been set on
such a basis as to provide an adequate return to the investor
by the commissions who have first evaluated the property in
use. Commissions, influenced largely by Supreme Court deci-
sions, formerly adopted the reproduction cost method as the
dominant basis for valuation in the determination of the

rate base. However, there appears to be a trend away from the reproduction value, in recent years towards the use of the actual value method. Along with this trend away from the use of the reproduction value method in the evaluation of the worth of a property, the commissions have tended to recognize lower rates of return on invested capital.

In general, the arguments in favor of the cost of reproduction are based on the theory that the public is entitled to service at a cost sufficient to support a fair return on an investment currently necessary to furnish that service. At the same time the company is entitled to a fair return on the capital investment, equal to that of another company established under current conditions and providing the same grade of service. This argument departs materially from the ideal case where the valuation provides a rate which allows for a fair return to the investor on the sum invested and a fair charge to the consumer for the service provided, based on the original cost of erecting the property.

When the investor is protected against declining prices, the consumer should be protected against increasing values, especially in the current case where the increase in property values may be largely a combination of circumstances which have arisen out of the normal growth of the communities in which the utility is serving.

Opposed to this argument is the case of the current economic situation which has indicated a decline in the purchasing power of money caused by a rising price level. To limit the return of the utility property at 1913 price levels would not be equitable from the standpoint of the investor in the light of present commodity prices. However, an investor who has committed his capital to industrial securities would find himself in a much more favorable position in that he would be able to profit from the increase in property values which has occurred over the last thirty-five years. However, insofar as the rate of return and the principal of bonds and preferred stocks are fixed in most cases, this argument can only apply to the common stock holder. Under the reproduction cost system, during a price inflation, there would be offered no appreciable help to the owner of debt securities who has suffered from diminishing purchasing power associated with the current price inflation. Conversely, the common stockholder has stood to gain somewhat, especially in cases where the equity is small in relation to a sizable gain in the value of the property. However, in a period of falling prices, which may be occasioned in the near future, the common stockholder could be completely wiped out and the investment position of the senior securities placed in a condition of near default if rates were reduced.

How much justification there is for apprehension concerning future unreasonable rate regulation of the industry

by commissions is a question; however, it is easily within the power of the Federal Government to subsidize public plants which, by means of unjust competition, could destroy the investment values of the privately owned electric utilities.

Destruction of the industry's investment values by means of Government competition may further occur in two ways: first, the Government, by increasing corporation taxes and reducing corporation profits, could undermine private industry to the extent that it would be unable to secure sufficient new capital to provide for normal expansion; and second, the Government then could step in and provide the plant and equipment that it has blocked private industry from procuring in the first place.

In the light of increasing load demands associated with the industry over the last decade, the requirements of the public for increased plant extensions and a better grade of public service must be ultimately financed by means of funds provided by the investor. Consequently, if the commissions deny the right of the investor to benefit from the appreciation in values of the plant, investable funds may be diverted to industries where the investor is not similarly restricted.

The question of surplus, as well as the question of total capitalization, is associated with the private electric operating utility industry and is likewise involved with the aspects of valuation. With regard to property which has

been acquired from surplus funds, the courts have been gener-
ally specific, in that where the earnings have arisen from
operations of an exceptional management, or from a restric-
tion upon dividends, and have not resulted from unjustifiably
high rate structures, these funds represented a reinvestment
in plant and are regarded as an item of cost which is passed
on to the public in the form of increased rates. From this
standpoint the investor has benefited theoretically from
the appreciated value of the plant, which has increased
materially over the last decade. This factor has been a
major contribution towards the maintenance of existing rate
structures and the stability of earnings on the part of the
industry. As in the case of depreciation, which is a charge
against the consumer, withheld surplus may be considered as
a charge against the investor. But as in the case of a
properly handled depreciation account, surplus that has been
turned back into plant as additions and betterments, has re-
sulted in an addition to the depreciated value of the original
plant where it has continued to earn a return for the investor.
These surplus funds have, through the process of reinvestment,
also provided the public with needed plant extensions and a
better grade of service at no additional cost.

B.   STATEMENT OF THE PROBLEM

To accomplish the purpose of this study it is
necessary to divide the material contained in this chapter
into two parts. The first part deals with the statistical
trend analysis of each ratio. The second part concerns the
results of these analyses with regard to the entire utility
financial problem. The total capitalization and surplus
ratios analyzed in this chapter are: reserves for depreci-
ation to total utility plant, total utility operating in-
come to total utility plant minus reserves for depreciation
plus working capital, and surplus to total liabilities, each
expressed in per cent. Also the dollar values of reserves
for depreciation and total utility plant are analyzed as a
means of further comparison. The data used in these statis-
tical analyses cover the years 1937 to 1947 inclusively.

C.   DESCRIPTION OF THE STATISTICAL METHODS EMPLOYED

The statistical trend analysis for each ratio is
based upon data taken from a publication of the Federal Power
Commission, Washington, D. C., entitled "The Statistics of
Electric Utilities in the United States Class A and Class B
Privately Owned Companies." The publication has been pub-
lished annually for eleven consecutive years (1936 to 1947)
and presents comprehensive financial and operating information
on every important privately owned electric utility in the
United States. This information is taken from the annual

reports of Class A and Class B privately owned electric
utilities submitted to the Federal Power Commission for each
year analyzed herein. Class A and Class B electric utilities
are those which have annual electric revenues of $250,000 or
more and who are required by the Commission to conform to the
uniform system of accounts adopted June 16, 1936.

The uniform system of accounts was promulgated by
the Commission following the approval of the Federal Power
Act of 1935 in order to correct accounting and financial
operations which adversely affected the investor and con-
sumer. Thus, practically all of the electric utilities in
the United States, whether their operations are interstate or
intrastate, keep books on essentially the same accounting
basis and make uniform reports of finances and operations.
It is estimated that at present in excess of 90% (1) of the
electric utility industry on the basis of assets are required
to conform to these accounting procedures. Likewise, the
data presented concerning the total capitalization and surplus
ratios analyzed are based upon statements of accounts and
statistics of individual operating companies only.

D. DEFINITION OF TERMS CONTAINED

The statistical treatment contained in this chapter
includes a time series analysis of the reserves for depre-

(1) Federal Power Commission, Washington, D. C., A Financial
Record of the Electric Utility Industry, 1945, p.2.

ciation, total utility plant expressed in billions of dollars
and the ratios of reserves for depreciation to total utility
plant, total utility operating income to net plant plus work-
ing capital and surplus to total liabilities, all expressed
in terms of per cent.

1. Reserves for Depreciation

The term "reserves for depreciation" used in this
study means only the reserves for depreciation and amorti-
zation of utility plant, regardless of the method of accrual,
whether straight line, sinking fund or other method employed.

2. Total Utility Plant

The term "total utility plant" comprises the invest-
ment by electric operating utilities in electric plant, as
well as other utility plant and adjustments unclassified and
undistributed.

3. Total Utility Operating Income

The term "total utility operating income" repre-
sents that amount of income available for return on the plant
investment. In the income statement of a utility this figure
represents the profit of the company before interest charges
on the long-term debt.

4. Net Plant

The term "net plant" refers to the value of the
total utility plant less the amount of the reserves for depre-
ciation which has been defined above.

5. Working Capital

      The term "working capital" used in this study is
the capital required to take care of the current operations
of the business. It is the capital required to pay labor
costs, fuel and other raw materials and to meet any other
costs and expenses incurred in the daily conduct of the
business.

6. Surplus

      The term "surplus" used in this study includes
capital as well as earned surplus.

7. Total liabilities

      The term "total liabilities" includes current and
accrued liabilities, capital stocks, long-term debt, deferred
credits, reserves for depreciation, contributions in the aid
of construction, and capital and earned surplus.

8. Standard Deviation

      The term "standard deviation" used in this chapter
is defined as the extent to which the data varied from the
arithmetic averages over the period. It is further defined as
the root-mean-square deviation about the arithmetic mean of
the data. (1)

9. Logarithms

      The term "logarithms" referred to in this chapter
is the common or Briggs logarithms which are logarithms to

(1) Riggleman, J. R. and Frisbee, I. N., Business Statistics,
     2nd Edition, McGraw-Hill Book Co., New York, 1938, p. 219.

the base 10. That is, if natural numbers are regarded as powers of 10, the exponents of the powers are the logarithms of the numbers.

E.   THE STATISTICAL TREND ANALYSES

An analysis of Figures 6, 7, and 8, pages 56, 58, and 60,respectively, reveal the following trends of the components of the total capitalization and surplus situations.

1.   Total Utility Plant

The value of the total utility plant in dollars as shown in Figure 6, page 56, has increased over the decade analyzed from approximately 13.9 billion dollars to 16 billion dollars, representing an increase of about 16%. It is noted in Figure 6 that during 1943 the value of the plant began to decrease until 1945 when the plant increased again. Of the over-all gain in plant, from 1937 to 1947, of approximately 16%, 10% of the total gain was recorded during the years 1945 to 1947.

The rate of growth to total utility plant as indicated by Figure 8, page 60, is for the most part very slow. A change in the slope of this curve after 1945 is slightly greater than the slope of the curve of reserves for depreciation over the same years. The significant fact here is that the rate of increase in plant has gone ahead of the reserves for depreciation which reflects the increased demands for plant on the industry following World War II. The relatively small increase in plant indicated between 1937 and 1945
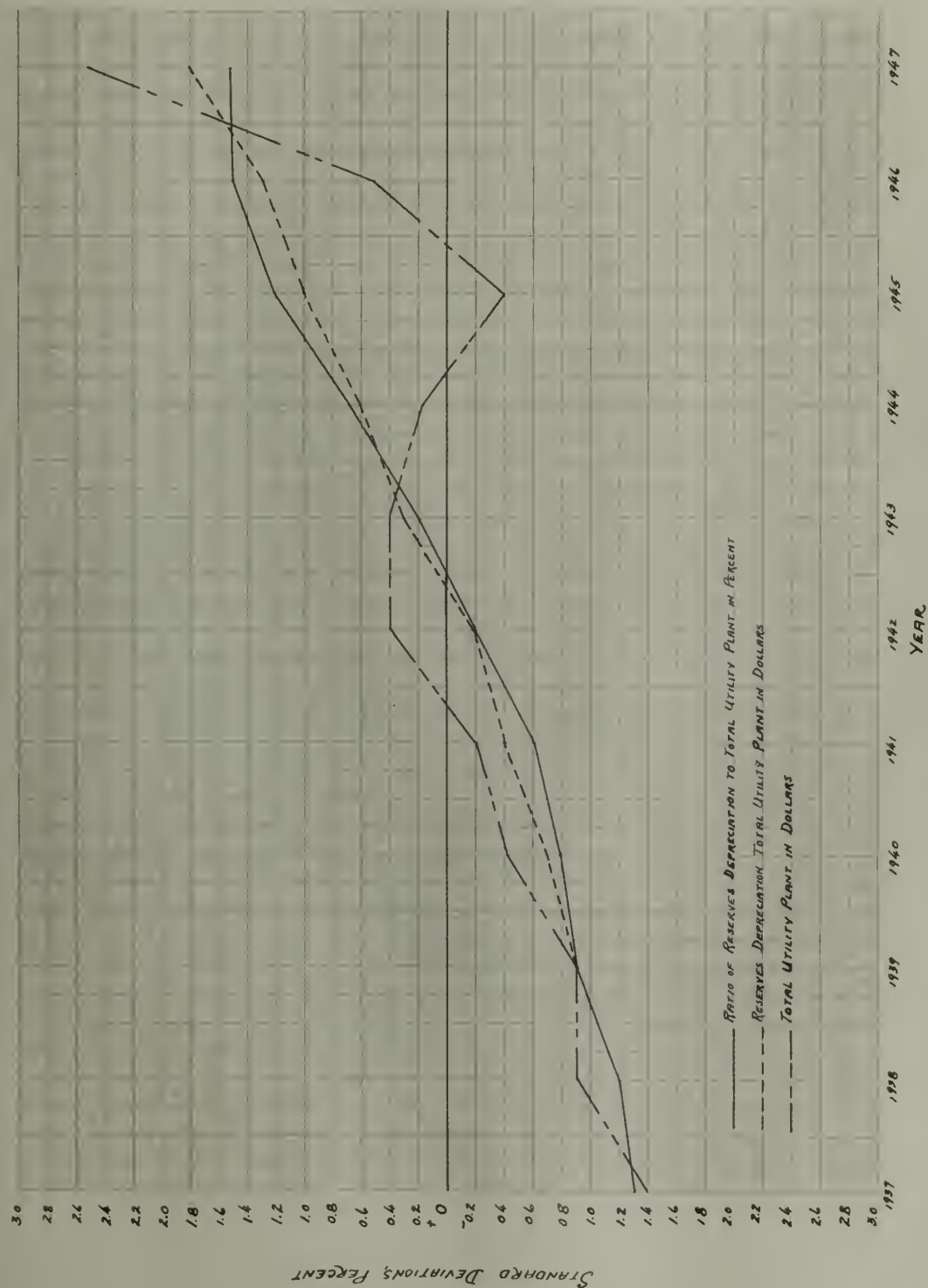
Fig. 6.- Comparison of Trends of Selected Total Capitalization Ratios for the Private Electric Operating Utility Industry in Terms of Their Standard Deviations from Normal 1937-1947

Source- Federal Power Commission, Washington, D.C.   Statistics of Electric Utilities in the U.S   1937-1947

reflects the effects of the war and the elimination, in accordance with the provisions of the previously described uniform system of accounts, (1) of a large amount of inflation from utility plant accounts resulting primarily from past write-ups. For instance, dispositions of amounts in excess of original cost approved or directed by the Federal Power Commission aggregated approximately 1.1 billion as of Dec. 31, 1945. As of September 30, 1946, such dispositions aggregated approximately 1.3 billion dollars. Considerable additional amounts have been disposed of since the adoption of the new uniform system of accounts by the action of state commissions in respect to electric utilities not subject to the jurisdiction of the Federal Power Commission.

The improvement that has been accomplished by the industry with regard to plant from 1937 to 1945 as indicated in Figure 6, has also been reflected in the decrease in the amount of investment reported to be "unclassified and undistributed" which is included in the present figures of total utility plant. In 1937 nearly 20% of the entire plant investment, or approximately $2\frac{3}{4}$ billion dollars (2), was reported to be unclassified and undistributed. However, at

(1) Federal Power Commission, op. cit. p. 4.
(2) Federal Power Commission, Loc. Cit.

58
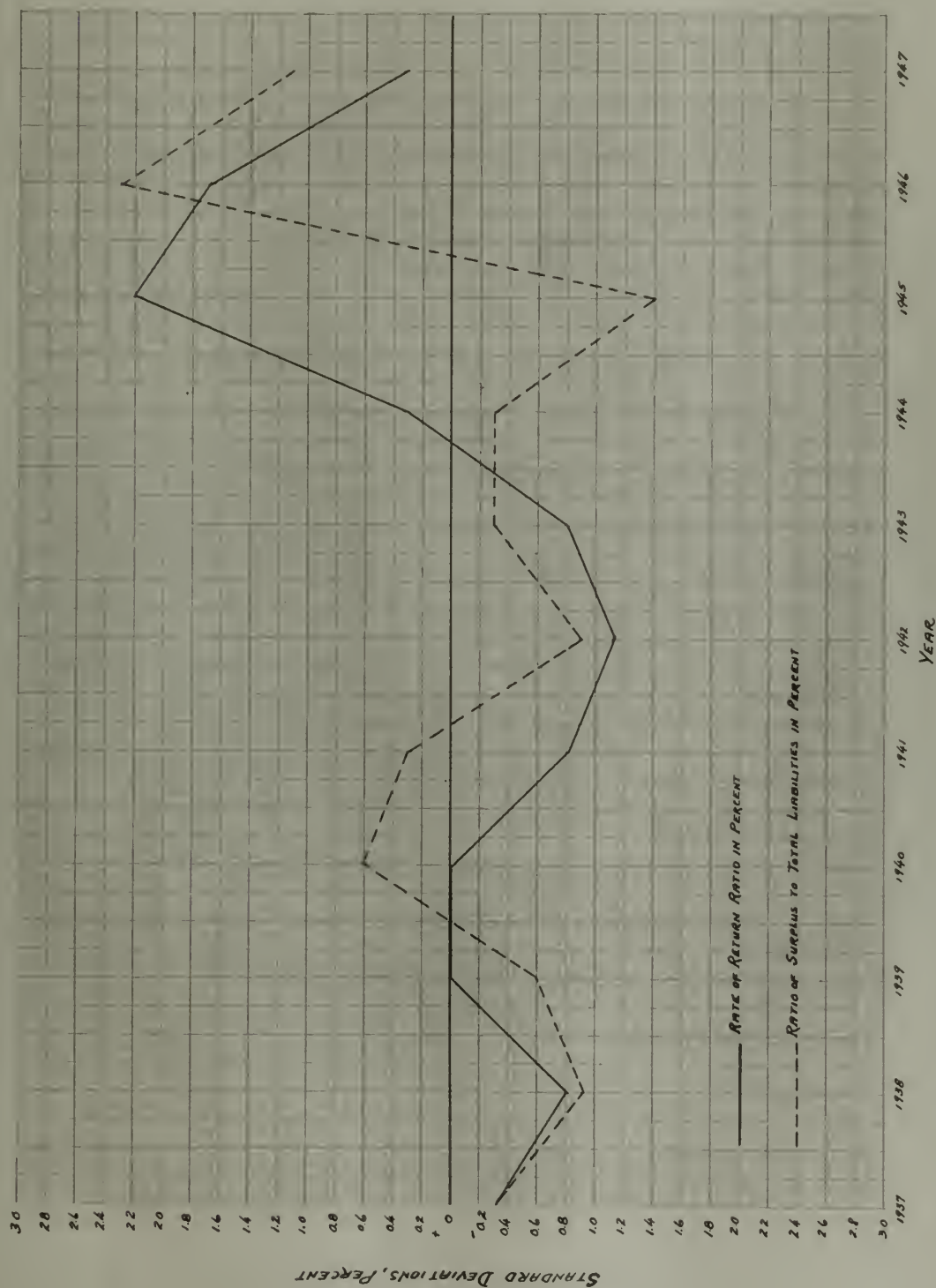
FIG.7- COMPARISON OF TRENDS OF SELECTED TOTAL CAPITALIZATION RATIOS FOR THE PRIVATE ELECTRIC OPERATING UTILITY
INDUSTRY IN TERMS OF THEIR STANDARD DEVIATIONS FROM NORMAL 1937-1947
SOURCE-FEDERAL POWER COMMISSION, WASHINGTON D.C.   STATISTICS OF ELECTRIC UTILITIES IN THE U.S. 1937-1947

the end of 1945 these unclassified amounts had been reduced
to less than 500 million dollars, or approximately 3% of the
total utility plant.

2. Reserves for Depreciation of Utility Plant

In the case of the reserves for depreciation of
utility plant in dollar values, as also indicated by Figure 6,
it is increasing proportionally less than the value of total
plant from 1937 to 1943, with the year 1938 as an exception.
In 1943 the reserves for depreciation increased in a still
greater proportion in relation to total plant because the
value of total plant was decreasing. However, during the
first six months of 1947 an intersection is effected between
the reserves for depreciation and the total utility plant
curves. The trend of the total utility plant at the end of
1947 is increasing to a greater extent than the reserves for
depreciation. The rate of growth in the reserves for depre-
ciation has, since 1937, been greater than the rate of change
in utility plant. This point is clearly indicated by Figure 8,
page 60. As a further check upon the accuracy of the trend
analyses of the dollar values of the reserves for depreciation
and total utility plant shown in Figure 6, page 56, the ratio
of reserves for depreciation to total utility plant is plotted
also. The results indicate a high degree of correlation ex-
isting between the reserves for depreciation in dollar values
and the ratio of reserves for depreciation to total plant in
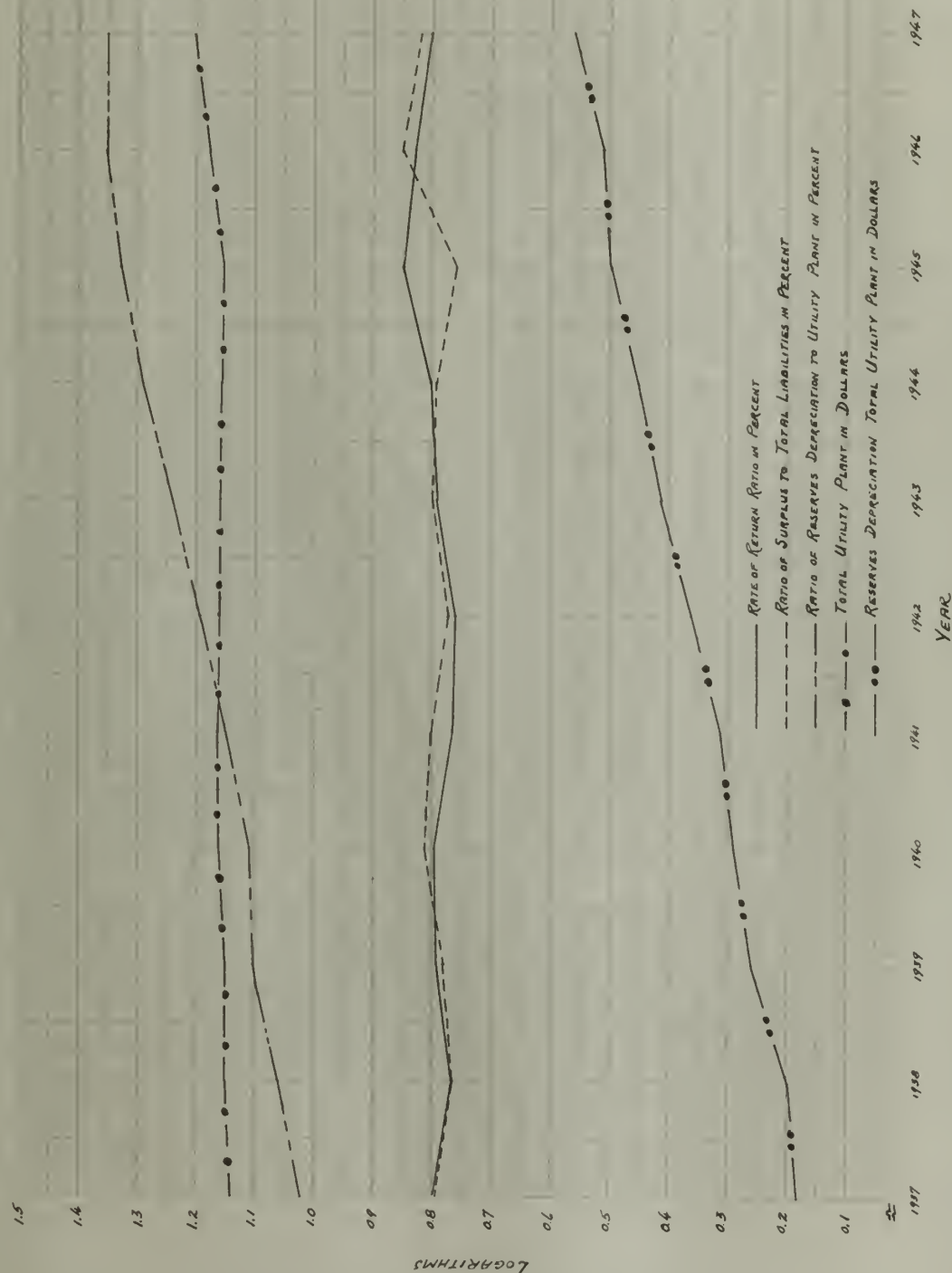
FIG 8 – COMPARISON OF THE RATES OF GROWTH OF SELECTED TOTAL CAPITALIZATION RATIOS FOR THE PRIVATE ELECTRIC OPERATING UTILITY INDUSTRY 1937-1947

SOURCE – FEDERAL POWER COMMISSION, WASHINGTON, D.C.   STATISTICS OF ELECTRIC UTILITIES IN THE U.S. 1937-1947

per cent with regard to the trends of these two quantities.
A similar correlation exists in Figure 8 where the slope of
both curves is, to all intents, parallel throughout the de-
cade. This latter fact indicates approximately similar rates
of growth of the two quantities.

Perhaps the most extraordinary fact is the manner
in which the increase in these reserves affected the total
utility plant, as shown in Table II, page 62. As previously
stated, the total utility plant increased approximately 16%
for the period analyzed, while depreciation reserves in-
creased about 140%. The resulting increase of 1% in net
plant is considered remarkable when it is found that over
the same period installed generating capacity increased 30%
and kilowatt hour sales increased 60%. (1)

The ratio of reserves for depreciation to plant
as shown in Table III, page 64, increased from 10.8% in 1937
to 22.3% in 1947, or about 12%. This increase in the reserve-
plant ratio is considered to be due to the effect of the
application of the new system of accounts, previously men-
tioned, with regard to both plant accounts and reserves. The
principle of the elimination of inflationary items from the
plant accounts and proper depreciation accounting are con-
sidered to be of primary importance to the consumer and the
investor in that proper provisions for the depreciation of
plant and equipment have to be currently made.

(1) Federal Power Commission, Loc. Cit.

TABLE II

COMPOSITE VALUES OF TOTAL UTILITY PLANT, RESERVE FOR
DEPRECIATION TOTAL UTILITY PLANT, AND NET UTILITY
PLANT FOR THE PRIVATE ELECTRIC OPERATING UTILITY
INDUSTRY EXPRESSED IN BILLIONS OF DOLLARS

1937-1947

Year	Total Utility Plant	Reserve for Depreciation Total Utility Plant	Net Utility Plant
1937	13.85	1.50	12.35
1938	14.05	1.63	12.42
1939	14.11	1.76	12.35
1940	14.41	1.91	12.50
1941	14.74	2.11	12.63
1942	14.85	2.31	12.54
1943	14.84	2.56	12.28
1944	14.75	2.82	11.93
1945	14.49	3.07	11.42
1946	14.95	3.33	11.62
1947	16.03	3.57	12.46

Source: Federal Power Commission, Statistics of Electric
Utilities in the United States, 1937-1947.

3. <u>Return</u> <u>to</u> <u>the</u> <u>Investor</u>

There is a good degree of correlation between the
trends of the fair rate of return ratio and the ratio of
surplus to total liabilities, as indicated in Figure 7,
page 58, over the period of 1937 to 1947 inclusively, with
the exception that in 1945 the apparent increase in the fair
rate of return ratio is mostly at the expense of the decrease
in net plant which accounted for a large proportion of the
total amount in the denominator of the ratio. However, as
indicated by Figure 8, page 60, this ratio of the rate of
return is relatively stable from 1937 to 1945. After 1945
there is a small decrease in this ratio up to the end of
1947. It is concluded that these two curves are well corre-
lated over the period and that the trend of surplus to total
liabilities after 1945 is lagging the rate of return ratio as
a barometer of economic fluctuation within the industry.

The rate of growth curves of the two ratios, as
indicated by Figure 8, page 60, are closely correlated through-
out the decade analyzed with the exception of the year 1945.
However, as previously noted, the industry has been in a posi-
tion during the decade to almost finance the total of plant
extensions out of revenues and reserves for depreciation. The
industry has for the most part demanded no further rate in-
creases over the period. Furthermore, the industry as a whole
has not been obliged to secure additional funds from outside
sources. It is, therefore, difficult to predict the true

TABLE III

COMPOSITE VALUES OF THE RATIOS OF SURPLUS TO TOTAL
LIABILITIES, FAIR RATE OF RETURN AND RESERVE
DEPRECIATION TO TOTAL UTILITY PLANT FOR
THE PRIVATE ELECTRIC OPERATING UTILITY
INDUSTRY EXPRESSED IN PERCENT
1937-1947

Year	Surplus to Total Liabilities	Fair Rate of Return Ratio	Reserve Depreciation to Total Utility Plant
1937	6.1	6.1	10.8
1938	5.9	5.9	11.5
1939	6.0	6.2	12.5
1940	6.4	6.2	13.2
1941	6.3	5.9	14.2
1942	5.9	5.8	15.5
1943	6.1	5.9	17.2
1944	6.1	6.3	19.1
1945	5.7	7.0	21.2
1946	7.0	6.8	22.3
1947	6.7	6.3	22.3

Source: Federal Power Commission, Statistics of Electric
Utilities in the United States, 1937-1947.

relationship between the rate of return ratio and the surplus
to total liabilities from a pure mathematical analysis es-
pecially where the 16% increase in plant was financed by
amounts retained out of reserves, either in the form of depre-
ciation, or amortization, or as surplus earnings after the
payment of dividends on preferred and common stocks. Likewise,
the surplus account in most public utility balance sheets has
been relatively small owing in part to the restriction on
earning power by commissions, and in part to the standpoint of
management which has shown a reluctance to disclose what
might be regarded as excess earning power. (1)

<p style="text-align:center">F. CONCLUSIONS OF THE TREND ANALYSES</p>

It is concluded from the foregoing trend analyses
that the value of the total utility plant has increased about
16% over the decade analyzed, of which 10% of the total gain
was recorded during the years 1945 to 1947. In the case of
the reserves for depreciation, it was found that this account
has increased tremendously over the percentage increase in
the total utility plant and amounted to approximately 140%
for the period. Therefore, the slight increase of only 1%
in net plant reflects the sizable amount of retirement re-
serve accounting of 125% and is remarkable in the light of
the fact that, during the same time, installed generating

(1) Jordan, David F., *Jordan on Investments*, 4th Revised
Edition, New York, 1941, Prentice-Hall, Inc., Chap. 21,
p. 364.

capacity increased 30% and kilowatthour sales increased
60%.

Likewise, during 1945 the industry strengthened
its financial position by means of adjustments to plant which
resulted in a total of recorded plant which was decreased
about $\frac{1}{4}$ of a billion dollars from the end of the previous
year. Also during 1945 the unclassified and undistributed
plant was reduced by more than $\frac{1}{2}$ a billion dollars which is
considered an extraordinary achievement in the disposition of
these inadequately supported accounts. Progress in the ac-
counting for these items was so advanced that at the end of
1945 approximately 90% of the remainder of these amounts was
contained in the plant of only four large utilities, with
one utility accounting for 1/3 of the total. (1)

During 1945 considerable further progress was made
in the setting up of proper composite depreciation reserves.
Composite reserves for the industry were increased almost
$\frac{1}{4}$ of a billion dollars while the ratio of reserves to plant
had increased to approximately 21%. During the period of
1946-1947 this ratio has been increasing still further to
approximately 22%.

The percentage ratio of total utility operating
income to net utility plant plus working capital, previously
referred to as the "rate of return ratio," as computed on the

(1) Federal Power Commission, Loc. Cit.

basis of book values, was relatively stable throughout the period (see Figure 7, page 58). In spite of the increased depreciation accruals that occurred in 1945, this ratio indicates a greater return to investors in 1945 than in 1937. Likewise, the stability of income over the period is an important factor in the cost of capital to the industry. The refinancing of public utility securities, discussed in Chapter II of this study, indicated a lowering in the costs of capital to industry because of this factor. The rate of return indicated a slightly downward trend after 1945.

The ratio of surplus to total liabilities, as shown in Figure 7, page 58, indicates a trend that is similar to the rate of return ratio except that in 1945 the two curves were in opposition to one another. This is to be expected when it is considered that a good deal of the strengthening effect of the utility plant occurred during that year. Also, further increases in plant during that year were financed either out of depreciation and amortization accruals, or from surplus earnings after the payment on preferred and common stocks. It is beyond the scope of this study to calculate the exact proportion contributed by the surplus account to plant additions.

Thus the over-all strengthening of the private electric operating utility industry, which was reflected in the trend analyses contained in this chapter, has been accomplished without rate increases and under the stress of

over the decade analyzed, through the process of reinvestment, have contributed greatly, along with funds provided by the total operating revenues, to satisfy the public's increased demands for more power and a better grade of utility service at no additional cost. However, the whole problem finally returns to the matter of the rate structure and the earnings of the industry in general.

In the light of increasing load demands facing the industry, plant extensions and a continued high grade of public service must be ultimately financed by means of funds provided by the investor. If the commissions deny the investor the benefits from the appreciation in values of the plant, funds will be diverted to those industries where the investor is not similarly restricted. It was shown in the statistical analyses that the industry could no longer continue to finance plant extensions out of depreciation reserve and operating revenue contributions.

The industry has continued to sell its product at reduced prices. It was shown that, in general, the industry has grown, that revenues have grown, and that the value of the plant has increased only moderately. Over most of the period it was financed out of depreciation and retained earnings without recourse to outside sources of capital. The rate of return to the investor was maintained. However, the growth in operating income has not increased in the same proportion as the growth in sales. It is concluded that the

growth in volume has obscured the most important factor in
the current problem, namely, the disproportionate lack of
growth of the operating revenue account in a period of such
high utilization of plant facilities.

In the previous chapter it has been shown that the
industry is going to require a substantial amount of outside
capital relative to the growth needs for the next five years.
To attract this additional capital investment at low cost, to
support the increased overhead and capital charges incurred,
and to maintain a favorable credit position, operating income
would have to increase for the industry as a whole. Plant
additions financed out of retained earnings and depreciation
reserves will have to be discontinued. Sales of new secur-
ities for the purpose of future plant extensions will have
to show a rate of return commensurate with the risk factors.

An addition to net plant increases the base for
rate-making purposes, but such an addition to plant does not
in itself provide increased operating income. Actual in-
creases in operating income have to come from one or more of
the following sources:

1. Periodic rate increases accompanied by a
continued growth in electric sales.

2. Savings in operating costs arising out of the
replacement of less efficient generating facilities.

3. Further increases in electric sales, thus making
for a high use factor of the added capacity.

4. A decline in the present high level of fuel and labor costs.

5. A decline in Federal and state taxes.

Sources 2 to 5 will be discussed in more detail in the next chapter associated with the operating ratio.

However, current Commission thinking with respect to the matter of rate increases by the industry (1) is a very controversial matter. It is suggested that the end process of rate making lies in the fair value of the property. A survey by the Federal Power Commission of 32 state commissions indicated that a total of 14, almost 50% of the total, listed the concept of value as the reasonable tests of the rate base. It was pointed out that the rate base was not the only controlling issue during the year 1947; commissions have begun to realize that the dollars in which utility plants have been recorded in the past are far different from the dollars in which consumers are now making payment for services rendered. In effect, commissions have begun to recognize that there is a difference between old costs and new costs in that more dollars are required per unit cost in the current situation. It was indicated further that there has been too much importance placed upon the contest between investors and consumers for the division of dollars remaining above operating expenses. From the investor and the company

(1) McQuillen, P. W., <u>Current Developments in Electric Rate Making</u>, P. U. F., October 21, 1948, Vol. 42, No. 10, p. 624.

points of view, it was considered equally important to have operating revenues in excess of operating expenses to provide adequately for the capital costs of the business. This last concept strengthens the position of the free enterprise system relative to the privately owned electric utility industry.

Therefore, it is concluded that the earnings record of the industry over the past ten years is a tribute to its engineering, its management and to its success in developing growth by means of increasing its efficiency and reducing rates. Paradoxically, the resulting decline in the margin of profit is probably a source of strength and a cause for progress provided that the effects of rising costs in the future and the declining margins have been absorbed in growth.

As indicated in Chapter II, the growth has not ceased; probably nothing will stop the indicated rate of growth of sales. Should the industry ever approach a saturation point, a continuation in the decrease of margins might prove destructive. In order to maintain the attractiveness of utility securities for the conservative investors, every effort should be made by the industry and the regulatory authorities to check the decline in the profit margins of sales.

CHAPTER IV

THE OPERATING RATIO--INCOME CONSIDERATIONS

A.   GENERAL COMMENTS

The operating ratio is the ratio between gross
earnings and the costs and expenses. A low operating ratio
indicates a highly efficient management. If it is found
that the capital investment is small, the operating ratio
may be relatively high and yet the return on the capital in-
vestment may be satisfactory. The operating ratio has been
used extensively in the analysis of utility statements and
is determined by dividing the operating costs by the gross
earnings. The factors which combine to make up the operating
ratio may be found in the income and expense statements of
the utility analyzed. These statements show the amount of
funds provided, indicating the sources thereof, and, on the
other hand, show to what uses the funds have been put and re-
flect the results, decisions, and policies of the management.
In a way the statement of sources and the applications of
funds answers the question, quite frequently raised, as to
what has been done with the net profits in a given company.

The income statements associated with private
electric operating utilities have, over the last decade,
indicated an uninterrupted decline in the average unit
selling price of the service. This reduction in the price
of electricity has been brought about by means of high
management efficiency in the fields of sales and engineering.

It was both the cause and consequence of the growth of the industry. However, at the same time it should be analyzed in relation to the decline in profits.

From the standpoint of the expense statement, operating expenses over the decade have been rising. This has been caused by the increased costs of taxes, wages, fuel and depreciation; and these factors considered in relation to gross income indicate a rising operating ratio. It was concluded in Chapter III that total utility plant had increased substantially over the decade analyzed. Although additions to plant theoretically increase the base for rate-making purposes, additions to plant do not in themselves provide increased gross incomes. Actual increases in gross income have to come from one or more of the following sources: (1) periodic rate increases; (2) a continued long-term growth of electric sales; (3) savings in operating costs arising out of the replacement of less efficient generating facilities; (4) still further increases in day-to-day electric sales, thus making for a high use factor of the added capacity; (5) a decline in the level of fuel and labor costs; (6) a decline in Federal and state taxes.

The question of property value is of greater significance in the case of the utilities than in the case of the industrials. In the latter case security values depend largely on earning power, which results from charges regulated by competition only. Regulation of the utilities, on

the other hand, does not guarantee that a fair rate of return will be earned by any given company on its property invest- ment. Even though the industry is protected against compe- tition from like concerns in the field, there still exists the constant threat of competition from the use of substitutes.

Likewise, from the utility economic standpoint there is the problem of rising production costs which require increased rates. However, increased rates may discourage consumption to such an extent that gross revenues will re- main constant or even decline. On the other hand, the util- ity industry operates under the law of increasing returns and, in general, operating expense cannot be reduced very readily as gross sales decline. Net earnings, therefore, may not al- ways be controlled through the rates allowed.

Another factor which enters into the question of earnings is the problem of a decreasing population within the area served. Furthermore, the management has to consider the possibility that regulatory bodies may render decisions rel- ative to the rate return in favor of the public from whom they derive their power. The tendency may be of greater or of lesser importance depending upon the state of the current business conditions. During periods of depression, regulatory bodies are more inclined to reduce rates in order to effect a condition of parity between the prices of the utilities and general industry. Such imposed rate reductions have little regard for the general principle of "fair return." On the

other hand, during more prosperous times, as of today, com-
missions have begun to recognize the necessity of fair treat-
ment to all and in most states it has appeared that an effort
is being made to regulate with that end in view.

Management is also concerned with the proper util-
ization of plant with regard to the high investment per sales
dollar of revenues and its effect on the profit margin. One
of the most important factors involved in this situation is
the matter of the load factor. Load factor is defined as
the ratio of average load to the peak load occurring during
a given period. Such variations in demand for utility ser-
vices present a two-fold problem to the management of a given
electric company. Besides furnishing the investor and the
commissions with an explanation of the need for the heavy
capital requirements and a means for evaluating the earnings,
the management is concerned primarily with the variations
of load. Obviously, the greater the maximum variations from
the average output, the greater the capital investment nec-
essary to deliver a given amount of service and the lower
the rate of gross return, other things being equal. Con-
versely, the smaller the variation between the average and
maximum output, the more effective the employment of the
investment in a given utility.

B.   STATEMENT OF THE PROBLEM

In order to facilitate the evaluation of the prin-
cipal factors which make up the operating ratio, the subject

matter will be divided into two chapters--income considerations
and expense considerations.

To accomplish the purpose of the study, as in the
case of each previous chapter, the first part of this chapter
will deal with a statistical analysis of each financial stan-
dard or quantity included followed by a discussion of the
results of the statistical analyses relative to the utility
financial problem. The statistical treatment contained in
this chapter includes a time series analysis of kilowatt-
hour sales, installed generating capacity, gross revenues,
total operating revenues, net income, net worth, and the cost
of living and consumer's cost of electricity indices.

1. The Revenue Side of the Income Statement

Stability of return and a growth trend, with which
nothing seems to interfere, have made the fixed obligations
of the electric operating utilities over the last decade one
of the first choices of the conservative investor in American
business. Therefore, the purpose of this section is to gain
whatever insight is possible, in the light of the scanty in-
formation provided by the standard investment texts with re-
gard to the make-up of the operating ratio, into the behavior
of utility earnings by comparing them with other phases of
general business in the different phases of the business cycle
over the last decade. Such comparisons will bring out the
long-term growth, relative fluctuations in operating revenues

and net income and other important factors associated with
the financial problem of the private electric operating
utility industry. The ratios analyzed in this section are:
total operating revenues to gross revenues, net income to
gross revenues, and net income to net worth, all expressed
in per cent. Also, gross revenues, total operating revenues
in dollar values, and installed generating capacity in kilo-
watts and sales in kilowatthours are analyzed as a means of
further comparison. The data used in these statistical anal-
yses covers the years 1937 to 1947 inclusively.

C. DESCRIPTION OF THE STATISTICAL METHODS EMPLOYED

The statistical trend analysis for each ratio is
based upon data taken from a publication of the Federal Power
Commission, Washington, D. C., known as the "Statistics of
Electric Utilities in the United States--Class A and Class B
Privately Owned Companies." This publication has been pub-
lished yearly for eleven consecutive years (1936-1947) and
has presented comprehensive financial and operating infor-
mation on every important privately owned electric utility
in the United States. Class A and Class B electric utilities
are those which have annual electric revenues of $250,000 or
more and which are required by the Commission to conform to
the uniform system of accounts adopted June 16, 1936.

The uniform system of accounts was promulgated by
the Commission following the approval of the Federal Power

Act of 1935 in order to correct accounting and financial
operations which adversely affected the investor and con-
sumer. Thus, practically all of the electric utilities in
the United States, whether their operations are interstate
or intrastate, keep books on essentially the same accounting
basis and make uniform reports of finances and operations.
It is estimated that at present in excess of 90% (1) of
the electric utility industry, on the basis of assets, is
required to conform to these accounting procedures. Like-
wise, the data presented concerning the ratios associated
with this section are based upon statements of accounts and
statistics submitted to the Commission and concern the ac-
counts and statistics of individual operating companies only.

D. DEFINITION OF TERMS CONTAINED

The statistical treatment contained in this chapter
includes a time series analysis of kilowatthour sales, in-
stalled generating capacity, gross revenues, total operating
revenues, net income, net worth, and the cost of living and
consumers' cost of electricity indices.

1. Gross Sales

The term "gross sales" used in this study means the
total kilowatthour sales to all customers served by the in-
dustry.

(1) Federal Power Commission, A Financial Record of the
     Electric Utility Industry, Washington, D. C., 1945, p. 4.

2. Installed Generating Capacity

The term "installed generating capacity" means
the combined installed generating capacity of the private
electric operating utility industry. This capacity includes
steam, hydraulic and internal combustion machinery.

3. Gross Revenues

The term "gross revenues" represents the total in-
come before the deduction of the operating expenses and inter-
est charges.

4. Total Utility Operating Revenues

The term "total utility operating revenues" repre-
sents that amount of income available for return on the
plant investment. In the income statement of a utility,
this figure represents the profit of the company before inter-
est charges on the long-term debt.

5. Net Income

The term "net income" refers to the value of income
available to preferred and common stock, and surplus.

6. Net Worth

The term "net worth" represents the amount by which
the assets owned exceed the amount of the liabilities owned.
The net worth of a utility is measured by the capital stock
accounts and surplus accounts.

7. Cost of Living and Cost of Electricity Indices

The terms "cost of living index" and "consumers'
cost of electricity index" are index numbers whose

percentages (1) are the averages of the five years 1935 to
1939 inclusive, the base period chosen by the United States
Bureau of Labor Statistics.

8. Standard Deviation

The term "standard deviation" used in this chapter
is defined as the extent to which the data varied from the
arithmetic averages for the period. It is further defined
as the root-mean-square deviation about the arithmetic mean
of the data. (2)

9. Logarithms

The term "logarithms" referred to in this chapter
is the common or Briggs logarithms which are logarithms to
the base 10. That is, if natural numbers are regarded as
powers of 10, the exponents of the powers are the logarithms
of the numbers.

E. THE STATISTICAL TREND ANALYSES

An analysis of the statistical data reveals the
following trends in the components of the revenue side of the
income statement associated with the operating ratio consider-
ations:

1. The Components Associated with Income

The value of kilowatthour sales, as indicated in
Figure 9, page 82, has increased markedly over the decade

(1) Edison Electric Institute, The Electric Industry,
420 Lexington Avenue, New York 17, N. Y., 1948, p. 10.

(2) Riggleman, J. R. and Frisbee, I. N., Business Statistics,
2nd Edition, McGraw-Hill Book Co., New York, 1938, p. 219.

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Fig. 9- Comparison of the Trends in the Components Associated With the Revenue Side of the Income Statement
for the Private- Electric Operating Utility Industry 1937-1947
Source - Federal Power Commission, Washington, D.C.   Statistics of Electric Utilities in the U.S.   1937-1947

Standard Deviations, Percent

Year

———— Gross Revenues in Dollars
——————— Kilowatthour Sales in Kilowatthours
———— Installed Capacity in Kilowatts
———— Total Utility Operating Revenues in Dollars

analyzed. Likewise, installed generating capacity and gross revenues have increased and show a good degree of correlation with gross sales. Percentagewise, gross sales increased about 48%, gross revenues increased about 40%, and installed generating capacity increased about 30%. The relationship between these three quantities appears to be reasonable, and it is quite possible that plant capacity was about optimum for the period. This latter fact is indicated by the relation between the curve of kilowatthour sales and installed generating capacity. The trends of these two curves appear to be about the same, on an average, over the period analyzed.

As previously stated, the increase in dollar values of gross revenues was about 40%. Gross revenues of all United States corporations in all lines of business, which were compiled by the Treasury Bureau of Internal Revenue, indicated an increase over the same period of about 30%. (1) This fact brings out the point that there was a more rapid growth on the part of the private electric operating utility industry than in industry in general. Also during the minor recession of 1938 and during the temporary reconversion slump after the end of World War II, there was practically no decline in revenues which means that there was a greater stability of earnings associated with the utility industry than with

(1) Temple, Alan H., _A Look at Your Earnings_, Edison Electric
    Institute, 420 Lexington Avenue, New York, June 2, 1948,
    p. 2.

industry in general. (1)

Figure 9 also compared the fluctuations of total utility operating revenues over the period analyzed with kilowatthour sales, gross revenues and installed generating capacity. It was noted that the fluctuations of this account were more erratic in their behavior than the other two accounts. The lack of correlation between total utility revenues and these other curves, beginning in 1940 and continuing through 1945, reflected increasing depreciation reserves, increased taxes, and increased operating expenses which consisted of fuel, wages and salaries, and maintenance.

Percentagewise, the over-all increase in the total operating revenues was about 6.1% for the decade analyzed. This fact indicated the relative stability of the earning power of the industry, but was not considered favorable in the light of the increases in gross revenues.

2. The Ratio of Net Income to Net Worth

The value of the ratio of net income to net worth, as shown in Figure 10, page 85, has increased over the decade analyzed. This ratio is known as the rate of return on net worth and represents the stockholders' equity after the deduction of debts. Beginning in 1937 the value of this ratio was 6.8%. In 1947 the value of the ratio had increased to

(1) Loc. Cit.
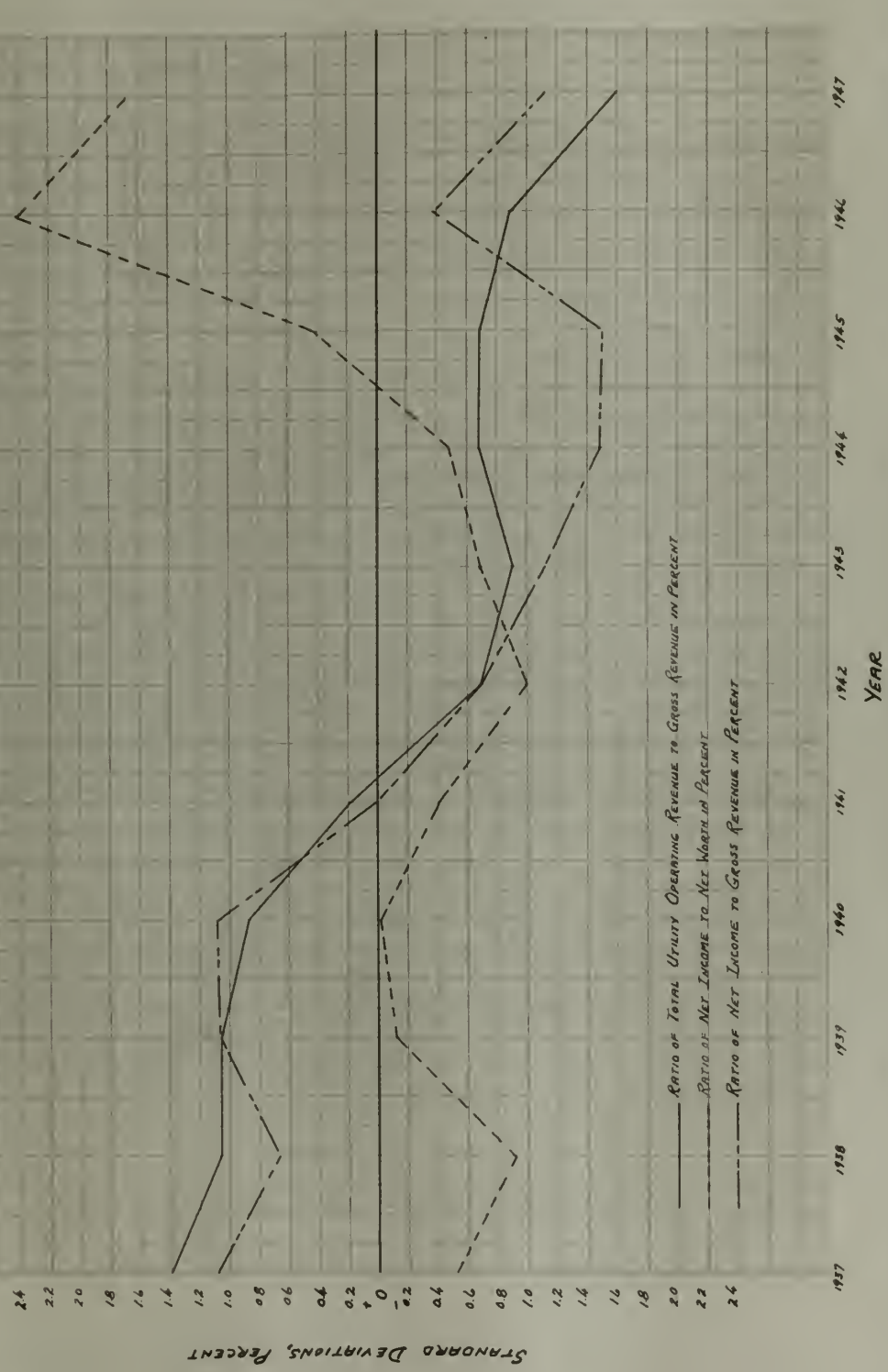
85

FIG. 10 - COMPARISON OF THE TRENDS IN THE COMPONENTS ASSOCIATED WITH THE REVENUE SIDE OF THE INCOME STATEMENT
FOR THE PRIVATE ELECTRIC OPERATING UTILITY INDUSTRY 1937-1947

SOURCE- FEDERAL POWER COMMISSION, WASHINGTON, D.C.   STATISTICS OF ELECTRIC UTILITIES IN THE U.S.   1937-1947

—————— RATIO OF TOTAL UTILITY OPERATING REVENUE TO GROSS REVENUE IN PERCENT

——·—— RATIO OF NET INCOME TO NET WORTH IN PERCENT

— — — RATIO OF NET INCOME TO GROSS REVENUE IN PERCENT

YEAR

STANDARD DEVIATIONS, PERCENT

8.5%, which was an increase of only 1.7%. It is concluded that the earnings rate of the industry was very consistent over the period analyzed. Figure 11, page 87, shows the rate of change in the trend of this ratio. Further, it is concluded that of the 1.7% change that occurred during the period analyzed, the largest percentage was accounted for between the years 1944 and 1946. This is indicated by the steep slope of the curve during those years.

The relative stability in the earnings of the private electric operating utility industry from 1937 to 1947 is reflected by the ratio of the rate of return on net worth. This ratio increased in value only slightly and maintained an average for the period of 7.2%. Compared with that of the trade corporations, which consist primarily of the retail store business, the utility industry was lagging the average by about 3%, (1) but on the whole was more consistent.

The industry compared with manufacturing was again lagging the average by about 5%. However, the showing was much better when compared with the transportation group, which had an average of 4% below that of the utilities for the period.

Therefore, it is concluded from the above comparisons that the utilities have earned on the average somewhat less

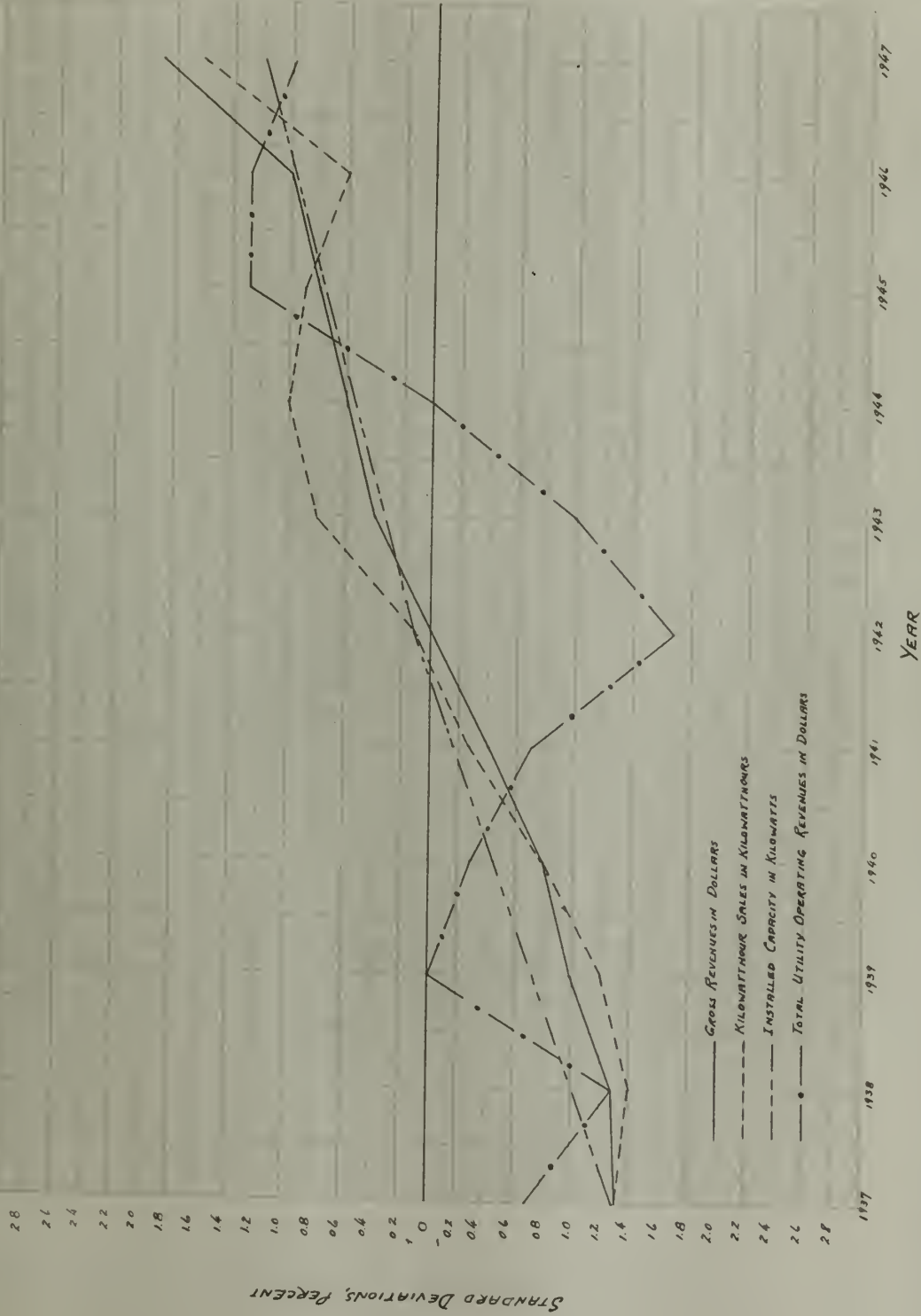(1) Temple, Alan H., Op. Cit., p. 83.
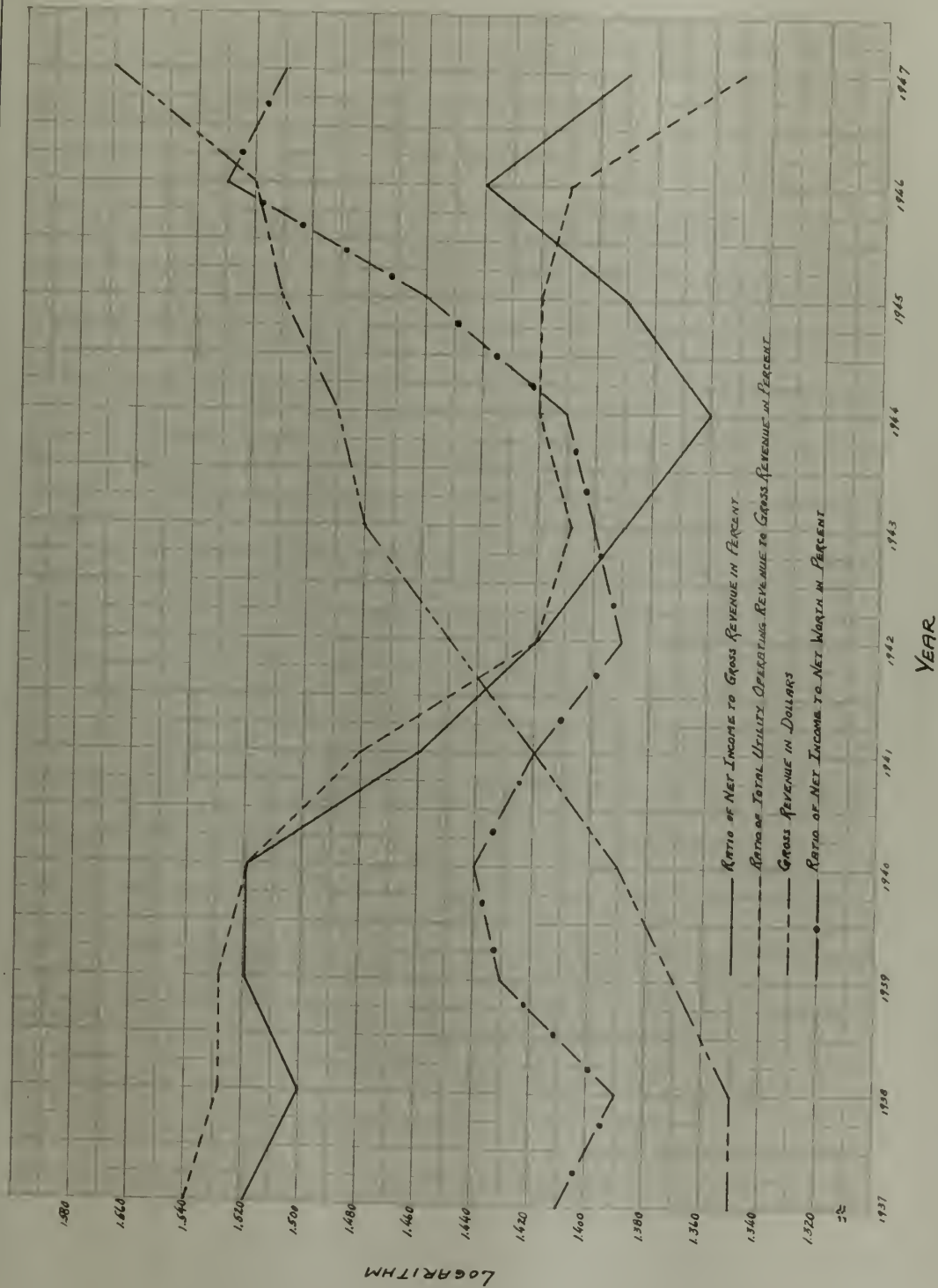
FIG. 11— COMPARISON OF THE RATES OF GROWTH IN THE COMPONENTS ASSOCIATED WITH THE REVENUE SIDE OF THE INCOME STATEMENT FOR THE PRIVATE ELECTRIC OPERATING UTILITY INDUSTRY 1937-1947
SOURCE- FEDERAL POWER COMMISSIONS, WASHINGTON, D.C. STATISTICS OF ELECTRIC UTILITIES IN THE U.S. 1937-1947

on their net worth than the manufacturing and trade groups;
however, they have done much better than the transportation
group. Also, it is concluded that the industry has shown a
greater stability of earnings than any of the above groups
associated with general industry.

3. The Ratio of New Income to Gross Revenues

In the case of the ratio of net income to gross
revenues, as indicated in Figure 10, page 85, when compared
with kilowatthour sales and gross revenues in Figure 9, page 82,
it is clearly shown that the utilities' net income has not in-
creased proportionally with the increase in gross revenues
over the decade analyzed. One of the reasons for the decrease
in this ratio has come about from pressure on both sides of
the profit and loss statement. On the revenue side there has
been an uninterrupted reduction in the average unit selling
price of electricity despite the substantial upturn in prices
of almost all commodities. A comparison of the ratio of net
income to gross revenues in Figure 10 with the cost of living
and the consumers' cost of electricity indices in Figure 12,
page 89, clearly explains this point. Also the same factors
are reflected in the ratio of total utility operating revenue
to gross revenue in Figure 10, which correlates quite closely
with the ratio of net income to gross revenues also in Fig-
ure 10. The lack of correlation between these two ratios
during the years 1943 through 1946 was probably caused by a
combination of the reduced cost of capital due to refinancing
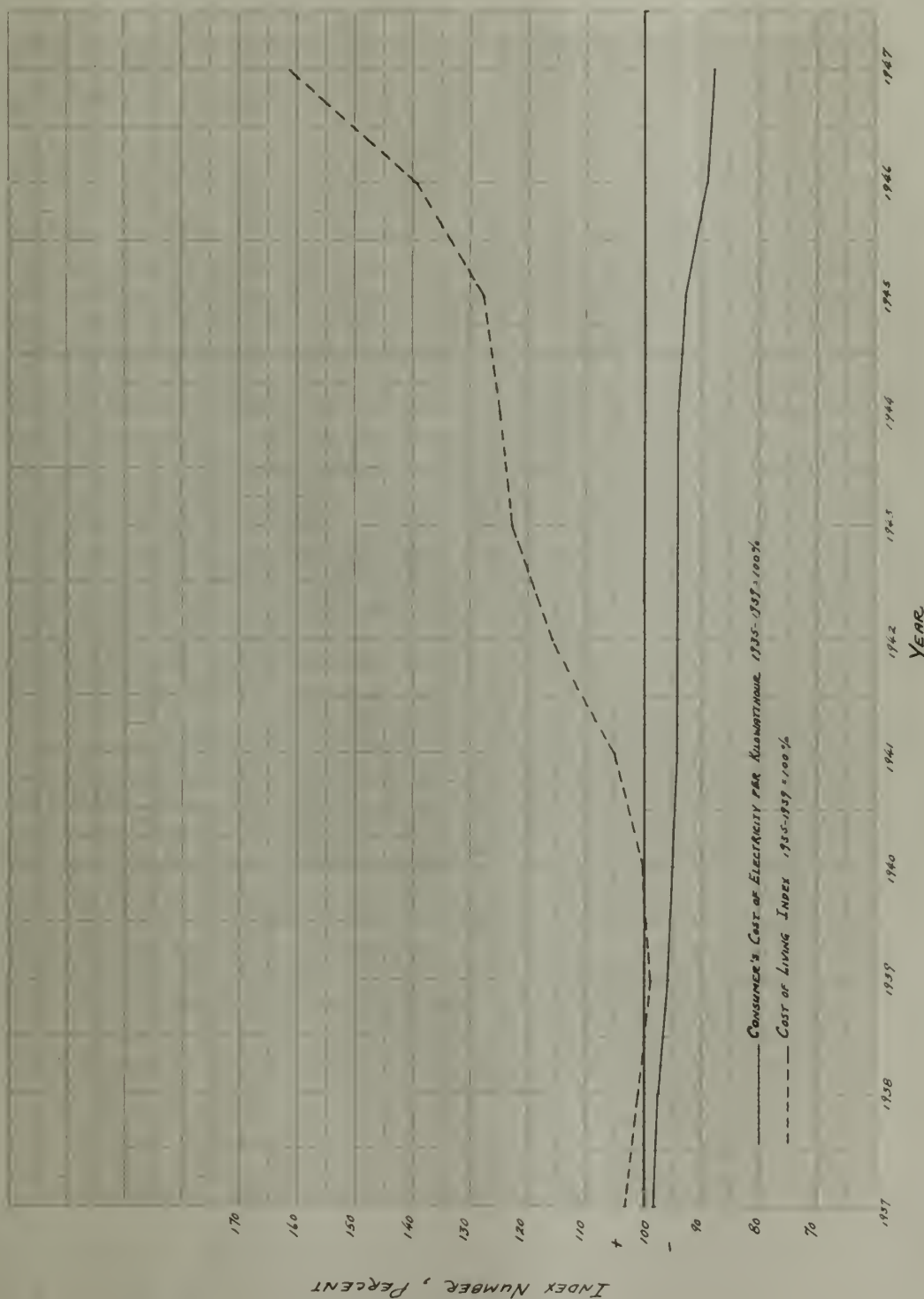
FIG. 12 - COMPARISON OF THE TRENDS IN THE COST OF LIVING INDEX AND THE CONSUMER'S COST OF ELECTRICITY
PER KILOWATTHOUR   1937- 1947

SOURCE - STATISTICS OF THE NATIONAL CITY BANK OF NEW YORK, NEW YORK CITY, N.Y.   1948

over that period and the absorption of operating expense by
means of increased gross revenues. The absorption of large
amounts of operating expense by means of the increases in
growth would tend to increase the ratio of total operating
revenues to gross revenues, while the refunding and refinancing
would, on the other hand, reduce the ratio of net income to
gross revenues. After these forces were finally brought into
balance during 1946, a condition of good correlation resulted.
As noted in Chapter II of this study, there appear to have
been only small fluctuations in the capital structure ratios
over the last decade. Therefore, the differences that oc-
curred between the operating revenues and net income were in-
volved in the changes in the level of operating expenses and
net income.

The rate of change in the trend of gross revenues,
when compared with the rate of change in the trend of the
ratios of total utility operating revenues to gross revenues
and net income to gross revenues, shown in Figure 11, further
substantiated the previous conclusions that gross revenues
have grown and plant has increased only moderately. The
increases in plant were financed for the most part out of
depreciation and retained earnings without recourse to out-
side sources of capital. Since 1942 at least, rate of return,
as shown by the curve of the ratio of net income to net worth,
has maintained a rate of growth similar to that of the rate
of growth in gross revenues. Meanwhile, however, the growth

in operating income did not keep pace with the growth in gross revenues. It is, therefore, concluded that the growth in volume has covered up trends which should now cause concern. The industry should have done better during a period of such high utilization of plant.

F. CONCLUSIONS OF THE STATISTICAL ANALYSIS

It is concluded from the results of the trend analyses, as shown in Figures 9, 10, and 12, that the private electric operating utility industry has earned on the average somewhat less on its net worth than the manufacturing and trade organizations. However, on the whole the industry has earned substantially more than the transportation corporations. Likewise, industry has also enjoyed a greater stability of earnings than any of the other groups previously mentioned. (1)

The previous charts showed that the net income of the electric operating utility industry has not increased proportionally with its gross revenues or its gross sales. This reflected the narrowing profit margin per sales dollar for the industry; the narrowing of electric profit margins has come about from pressure on both sides of the profit and loss statement. On the revenue side there has been an uninterrupted reduction in the average selling price of the elec-

(1) Loc. Cit.

tric services despite the substantial upturn in the prices
of almost everything else; this is shown quite clearly in
Figure 12. At the end of 1947 the general cost of living
index was about 62% above the 1935-1939 normal, whereas
the price of electricity was about 12% below the 1935-1939
normal. Although the reduction in the price of electricity
over the period analyzed is a stupendous achievement, at the
same time however, it should be viewed in relation to the
decline in the profit margins due mostly to increased oper-
ating expenses. Further declines in net income, as indicated
by lower returns on property, will have their effect upon the
general problem of raising new capital for the industry. New
capital becomes of even greater importance in the light of the
heavy expenditures for plant and equipment that will be re-
quired in the near future.

Finally in an attempt to sum up the significant
aspects of the private electric operating utility industry,
as compared with the record of all manufacturing corporations,
the utilities show an increase of about 20% in gross plant,
an increase in installed generating capacity of about 30%,
an increase in kilowatthour output of approximately 66%, and
an increase in net income available to capital stock and
surplus of about 25% over the period analyzed. On the other
hand, all manufacturing corporations increased their gross
plant 48%, their physical output 66%, and their net income
by nearly 300%. (1)

(1) Temple, Alan H., Op. Cit., p. 6.

It is with the implications of declining selling prices, rising operating costs and declining profit margins that the utility industry must concern itself. Demand has grown, gross revenues have grown, plant has grown only moderately, and, over most of the period, it was financed out of depreciation and retained earnings without recourse to outside sources of capital. The rate of return on the common stock was maintained mostly at the expense of refinancing the long-term debt during the years 1941 to 1945 inclusive; however, the growth in operating income did not keep pace with the growth in gross revenues. It is concluded that the growth in volume has covered up operating expense trends which may be a cause of great concern. Also the industry should have been able to provide a greater return on the common equity during a period of such high utilization of plant. Furthermore, it should be remembered that the large increases in the net profits of manufacturing companies following the end of World War II have consisted in part in the selling of more goods at advancing prices and reaping the resulting inventory profits. The utility industry, on the other hand, has been selling electricity at declining prices and from the nature of its product was generally unable to enjoy this source of profit.

G. IMPLICATIONS OF THE TREND ANALYSIS IN THE LIGHT OF THE CURRENT UTILITY FINANCIAL PROBLEM

The results of the statistical analyses indicate that the private electric operating utilities have, over the

decade analyzed, enjoyed sizable increases in electric sales.
By means of this increased growth, accompanied by the most
efficient use of the plant and equipment, the industry has
been able to maintain its earnings, which were on the whole
comparable with the earnings of general industry, over the
period analyzed. However, it was indicated that the growth
in the operating income did not keep pace with the growth in
the business. In other words, the growth in volume has
covered up trends which should now cause concern. A compar-
ison of the electric utilities with general industry during
the period shows that the electric utility industry should
have done better during a period of such high utilization of
plant.

The factors which have contributed to the make-up
of the operating ratio have been on the increase since 1939.
Federal Power Commission data on Class A and Class B electric
operating utilities have indicated that increased costs of
operation were present. During 1939 and 1940, the industry's
most profitable years of operation, as shown in Figure 10,
the operating ratio[*] stood at 42.1%. In 1942 it had risen to
42.8% and, most noticeable, in 1945 it had risen to 45.8%; in
1946 it rose sharply to 48.2% (1).

Although the information contained in this section
is concerned with the revenue side of the income statement,

*This ratio does not include depreciation and tax charges.

(1) Federal Power Commission, Statistics of Electric Utilities
     in the United States, S-65, 1947, Washington, D. C.,
     pp. XIII-XIV.

the rise in the operating ratio over the decade has a distinct effect upon profits. Profits should have risen in the light of the increased production, assuming that proper rate increases could have been had from the commissions. However, it might be said that in the light of recent evidence, general price increases have passed their peak and demands by the industry for rate increases should be withheld assuming that the cost of supplies, wages, taxes and other operating expense items become stabilized or begin to diminish. Earning power should continue to be maintained at present levels, even rising to higher values in that event.

The electric utility industry has an element of basic strength that is not perhaps generally realized. This is its ability, shown over the past many years, to effect continuous operating economies. Without a careful analysis of the record, this would not be apparent to the observer since the financial benefits have been passed on to the consumer, in the form of continuous rate reductions. (See Figure 12, page 89.) Moreover, the possibility of future economies are by no means exhausted. New generating equipment that is being installed requires less attendance, and there will be further savings in fuel costs as some of the older, relatively inefficient generating units go back to emergency use or are retired.

In a period of sharply rising costs, particularly wages, there will naturally be a certain time lag before the

influences of increased operating efficiencies plus increased
volume of revenues begin to assert themselves. The signifi-
cance of this is that, if operating costs rise to a point
where a reasonable return is not being earned, the industry
will merely defer further rate reductions until profits be-
gin to rise again.

Perhaps even more important than the height of the
operating ratio is its make-up. For the entire period an-
alyzed the sensational increase in costs is represented largely
by fuel and tax charges--fuel and tax charges since 1937 have
been larger than any other expense item, not even excepting
total wages and salaries paid. Taxes were outside of manage-
ment control and they were one of the principal causes for
the decline in profit margins on sales during the war years.
However, the peak of taxes was reached in 1943 and 1944 and
then declined, but this was followed by rapidly increasing
costs of wages and salaries. Fuel costs after 1945 indicated
unusual increases along with gross revenues. Depreciation
charges have also grown steadily along with the increases in
total plant and will continue to grow in the future. The
reduction in interest charges over the period has been a
welcome and important offset to the increase in practically
all other expenses associated with the industry's operations.
Statistical data compiled by the Federal Power Commission
relative to the matter of electric utility cost units reveal

the following information: during the period 1937 to 1947
fuel costs increased 300%; tax charges increased 110%; wages
and salaries increased 73%; depreciation charges increased
51%; and interest charges decreased 28%. (1)

On the revenue side, presently concerned, there is
a figure derived from the highest load factor in the peace-
time history of the electric utility industry. The new re-
cord peak load, reached in 1947, showed a secondary peak load
of 47.5 billion kilowatts in the face of a reported net assured
capacity of 44.1 billion kilowatts, which indicated a utiliza-
tion factor of over 100%. (2) It is possible that the load
factor might go down; in fact it suggests a vulnerability to
change. With labor costs in electric utilities not organized
to cooperate and facilitate the reduction in these costs, if
revenues should take a dip, accompanied by increased costs of
capital which have joined with labor costs as a fixed charge
in utility operations, the effects might well be disastrous.

Furthermore, the larger amount of working capital
required in the current dollar amounts for payrolls, combined
with increased costs of taxes, fuel, depreciation reserves,
bond interest, etc., indicates that it is quite possible that
certain rigidities may have crept into the current operating
situation.

(1) Federal Power Commission, Statistics of Electric Utilities
     in the United States, 1937-1947, Washington, D. C.,
     pp. XVIII-XX.

(2) Waterman, M. H., Regulation and the Equity Capital Problem,
     Public Utilities Fortnightly, Vol. 42, No. 12, Nov. 18, 1948,
     pp. 709-721.

In conclusion, it is fortunate that the growth of the private electric operating utility industry is still increasing; however, in the future it is possible that the present rate of growth may slow down, or even stop temporarily. Although conservative investors have always been attracted by the industry's growth and stability, it is likely that in the light of the current factors their feelings may not be entirely free of concern when considering the industry's declining profit margins. According to Dr. D. H. Bellemore, Head of the Department of Economics, Boston University College of Business Administration, Boston, Massachusetts, "The actual spread between incremental revenues and incremental costs for the electric utilities at present represents but 3 3/4 mills for each kilowatthour sold." Therefore, in order to maintain the industry's currently strong financial position, every effort should be made by management and by regulatory authorities to check the decline in the profit margins on sales.

CHAPTER V

THE OPERATING RATIO--EXPENSE CONSIDERATIONS

A. GENERAL COMMENTS

In the previous section it was indicated that the net income of the private electric operating utility industry, over the last decade, had not increased proportionately with the growth in gross revenues. This narrowing of the profit margins had come about from pressure on both sides of the profit and loss statement. On the revenue side there was an uninterrupted reduction in the average unit selling price of electricity, as compared with substantial increases in the selling prices of practically all other commodities. On the expense side of the profit and loss statement pressure was exerted by the increases in costs associated with the operation of the industry. These increased costs of operation, considered in terms of the increase in gross revenues, indicated the cause for the decline in the profit margins on sales. It was by means of the increased growth in sales accompanied by the most efficient use of the plant and equipment that the industry was able to maintain its earnings over the period analyzed. It was further indicated that the growth of the operating income did not keep pace with the growth of the business; in other words, the growth in gross revenues has undoubtedly covered up trends which should cause concern.

B. STATEMENT OF THE PROBLEM

It is therefore the purpose of this section to analyze the principal items of expense associated with the operation of the private electric operating utility industry in terms of their relative effect in connection with the decline in the industry's net profits on sales. It is also necessary to determine the trends of these expense items in relation to gross revenues and the implications of those trends in the light of the over-all utility financial problem.

The principal expense items analyzed in this section are in the form of ratios expressed in terms of gross revenues as follows: operating expenses to gross revenues, depreciation and amortization to gross revenues, taxes to gross revenues, fuel to gross revenues, all expressed in per cent; and gross revenues expressed in billions of dollars. The data used in the statistical analyses cover the years 1937 to 1947 and are taken from a publication of the Federal Power Commission known as the "Statistics of Electric Utilities in the United States, Class A and Class B Privately Owned Companies." This publication, as previously stated, has appeared yearly for eleven consecutive years (1936 to 1947) and presents comprehensive financial and operating information associated with Class A and Class B private electric operating utilities.

C. DEFINITION OF TERMS CONTAINED

The statistical treatment contained in this section involves the following quantities: gross revenues, operating

expenses, depreciation and amortization, taxes, fuel, the
operating ratio, and the operating expense ratio.

1. Gross Revenues

   The term "gross revenues" represents the total in-
come before the deduction of the operating expenses, taxes,
depreciation and amortization, and interest charges.

2. Operating Expenses

   The term "operating expenses" includes the oper-
ating expenses of all departments as well as the cost of
fuel, salaries and wages, and maintenance, but does not in-
clude charges for taxes and depreciation and amortization.

3. Depreciation and Amortization

   The terms "depreciation and amortization" represent
the value of the funds withheld from gross revenues each year
on the part of the industry for the purpose of representing
the true current value of the fixed assets in the balance
sheet.

4. Taxes

   The term "taxes" includes the total tax charges
levied by state and Federal authorities on all departments
of the industry for each year analyzed.

5. Fuel

   The term "fuel" includes the total cost that the
industry paid out for fuel each year in the generation of
electricity by means of steam power and internal combustion
engine power.

6. The Expense Ratio

The term "expense ratio" is the ratio of operating expense, depreciation and amortization and taxes to gross revenues in per cent.

7. The Operating Ratio

The term "operating ratio" contained in this section refers to the ratio between the operating expenses defined above and gross revenues.

8. Standard Deviation

The term "standard deviation" used in this chapter is defined as the extent to which the data varied from the arithmetic average for the period. It is further defined as the root-mean-square deviation about the arithmetic mean of the data. (1)

9. Logarithms

The term "logarithms" referred to in this chapter is the common or Briggs logarithms which are logarithms to the base 10. That is, if natural numbers are regarded as powers of 10, the exponents of the powers are the logarithms of the numbers.

D.   THE STATISTICAL TREND ANALYSES

An analysis of the statistical data reveals the following trends in the principal expense items associated

(1) Riggleman, J. R. and Frisbee, I. N., Business Statistics, 2nd Edition, McGraw-Hill Book Co., New York, 1938, p. 219.

with the expense side of the profit and loss statement:

1. Operating Expense to Gross Revenues

The ratio of operating expenses to gross revenues, known as the operating ratio, as indicated in Figure 13, page 104, decreased to its lowest level in 1939. Since 1939 it increased rather slowly until the beginning of World War II in 1941. However, this increase from 1939 to 1941 did not gain back all of the losses incurred between 1937 and 1939 which were principally caused by the 1938 depression. The plateau that existed in the trend of this ratio from 1941 to 1944 clearly indicates the effect of World War II upon the relation existing between operating expense and gross revenues; Figure 14, page 105, shows the manner in which the increases in gross revenues have absorbed the increased operating expenses from 1941 to 1944. After 1944 the growth of gross revenues did not increase at the same rate as operating expenses and after 1946 particularly, it is with the implications of declining selling prices, rising operating costs, and declining profit margins on sales that the industry must concern itself. Following the year 1946 the trend of the ratio of operating expense to gross revenue increased still further indicating the effect of rising prices on costs following the relaxation of price and wage controls during the post-war boom period.

Percentagewise, the value of the ratio was 48% in 1937. It did not vary more than 1% over the period from 1939

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Fig. 13 - Comparison of the Trends in the Components Associated with the Expense Side of the Income Statement for the Private Electric Operating Utility Industry 1937-1947
Source- Federal Power Commission, Washington, D.C. Statistics of Electric Utilities in the U.S. 1937-1947

Fig. 14 – Comparison of the Rates of Growth in the Components Associated with the Expense Side of the Income Statement for the Private Electric Operating Utility Industry 1937-1947

Source – Federal Power Commission, Washington, D.C. Statistics of Electric Utilities in the U.S 1937-1947

to 1944. After 1944 there occurred an increase of almost
9% which was effected to a large degree by the rising costs
of fuel and wages.

Throughout the period the trend in gross revenues
was increasing. Dollar values of gross revenues in 1947
were observed to have increased about 42% over the corres-
ponding value in 1937, while the dollar value of the oper-
ating expenses increased nearly 50%. Figure 14, page 105,
shows the spread between the rate of growth of gross revenues
and the costs of operation up to 1944. At this point the rate
of growth in operating expenses was increasing at almost the
same rate as gross revenues. However, during the period of
December 1946 to December 1947 the rate of growth in the
operating expenses was exceeding the rate of growth in gross
revenues. This means that the operating expenses, which are
the principal factors in the make-up of the operating ratio,
have increased to such an extent that they are increasing at
a greater rate than that of gross revenues.

2. Taxes to Gross Revenues

The variations in the trend of the ratio of taxes to
gross revenues, as shown in Figure 13, page 104, indicates a
slowly increasing trend up to 1940 where it increased quite
rapidly to a peak in the 1942-1943 period. After 1943 the
trend in this ratio began to decrease through 1947. The
tremendous increase in this item over the 1940 to 1944 period
was caused by the excess profit taxes levied by the Federal
Government upon the industry during World War II. From a

dollar value standpoint, taxes increased about 115% from
1937 to 1945; after 1945, taxes were reduced slowly up to
1947 when they were still about 105% of the 1937 value and
10% below the 1945 figure. Over this period gross revenues
increased about 47%. However, an analysis of the rate of
change in the ratio of taxes to gross revenues indicated
that although taxes were an important factor in the cost of
operation during the war, they never approached the rate of
growth of gross revenues, as indicated in Figure 15, page 108.
From 1943 to 1947 they were decreasing while operating ex-
penses were rising, as shown in Figure 13, and a cross-over
was effected between these two expense item trends during the
period between 1944 and 1946. This fact explained the answer
to the question why the trend of the ratio of total utility
operating revenues to gross revenue, shown in Figure 10,
Chapter IV, was fairly constant throughout the period 1943 to
1946. It was noted in Chapter IV that the average trends of
the ratios of net income to net worth, total utility oper-
ating revenues to gross revenues, and net income to gross
revenues, during the period 1943 to 1946, were not well cor-
related. (See Figure 10, page 85.)

The increasing trends in the ratios of net income
to net worth and net income to gross revenues reflect the
decline in interest charges on debt securities and dividends
on the preferred stock as well as the corresponding increase
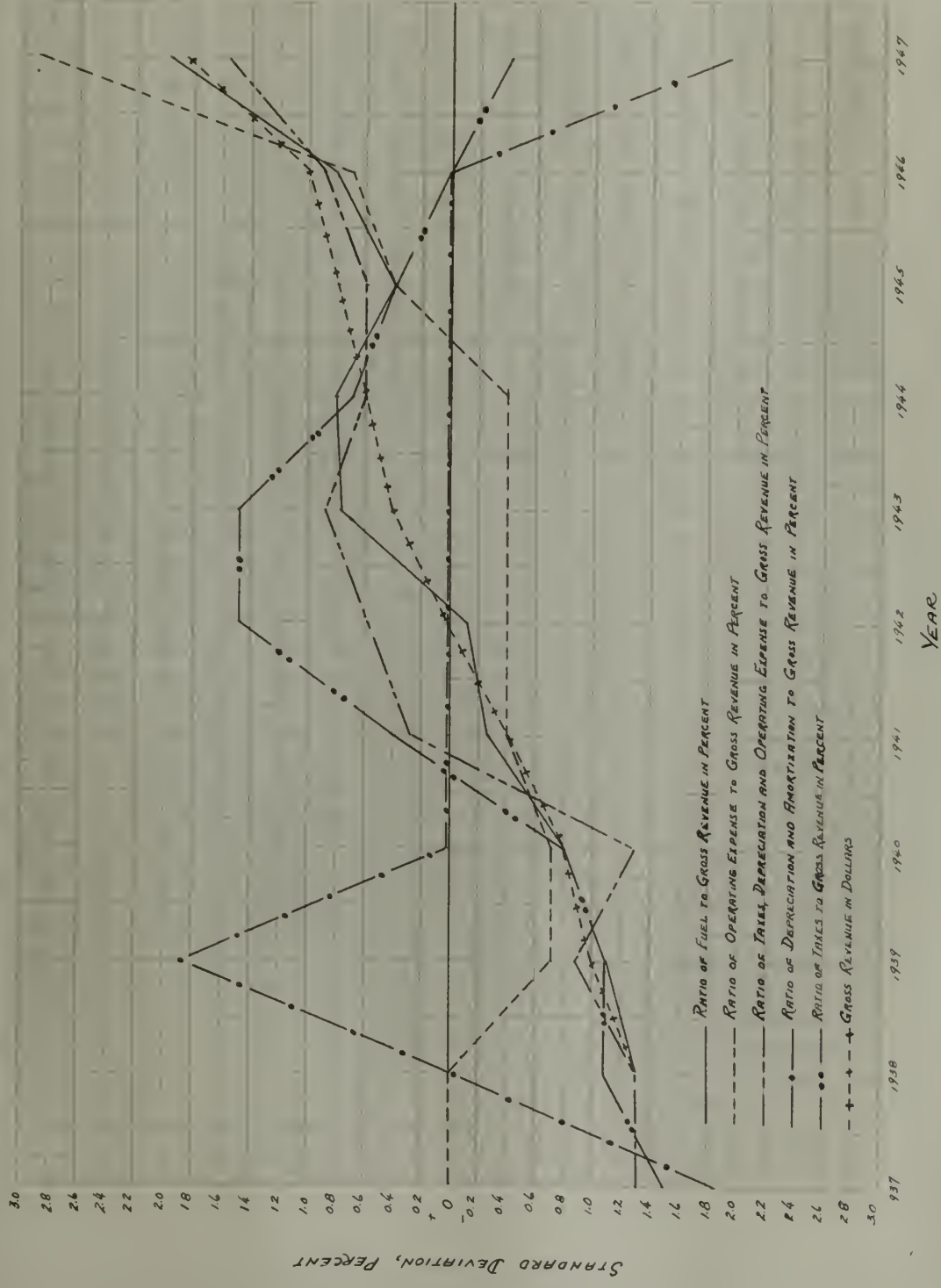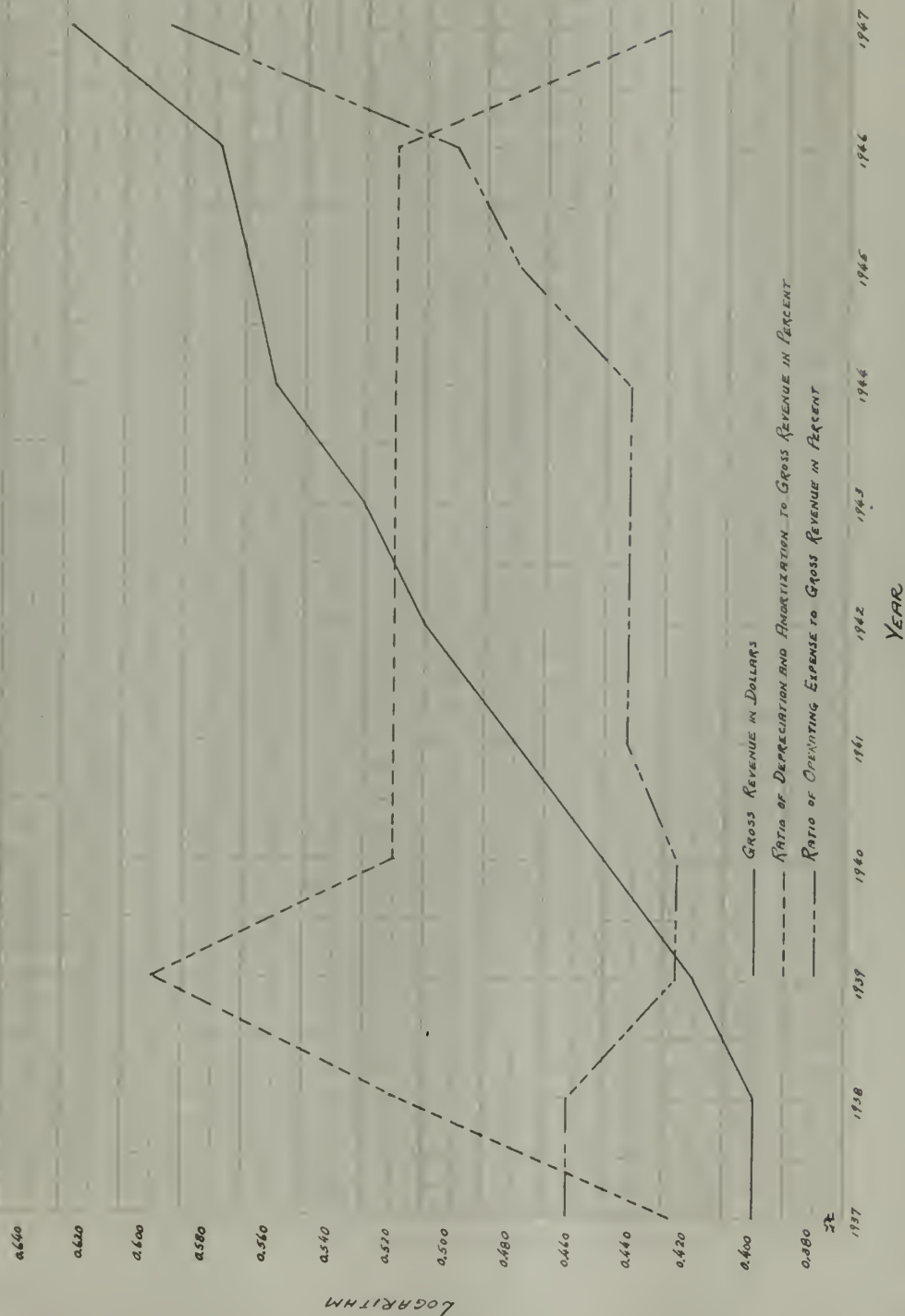in the amount of net income available to the common stock
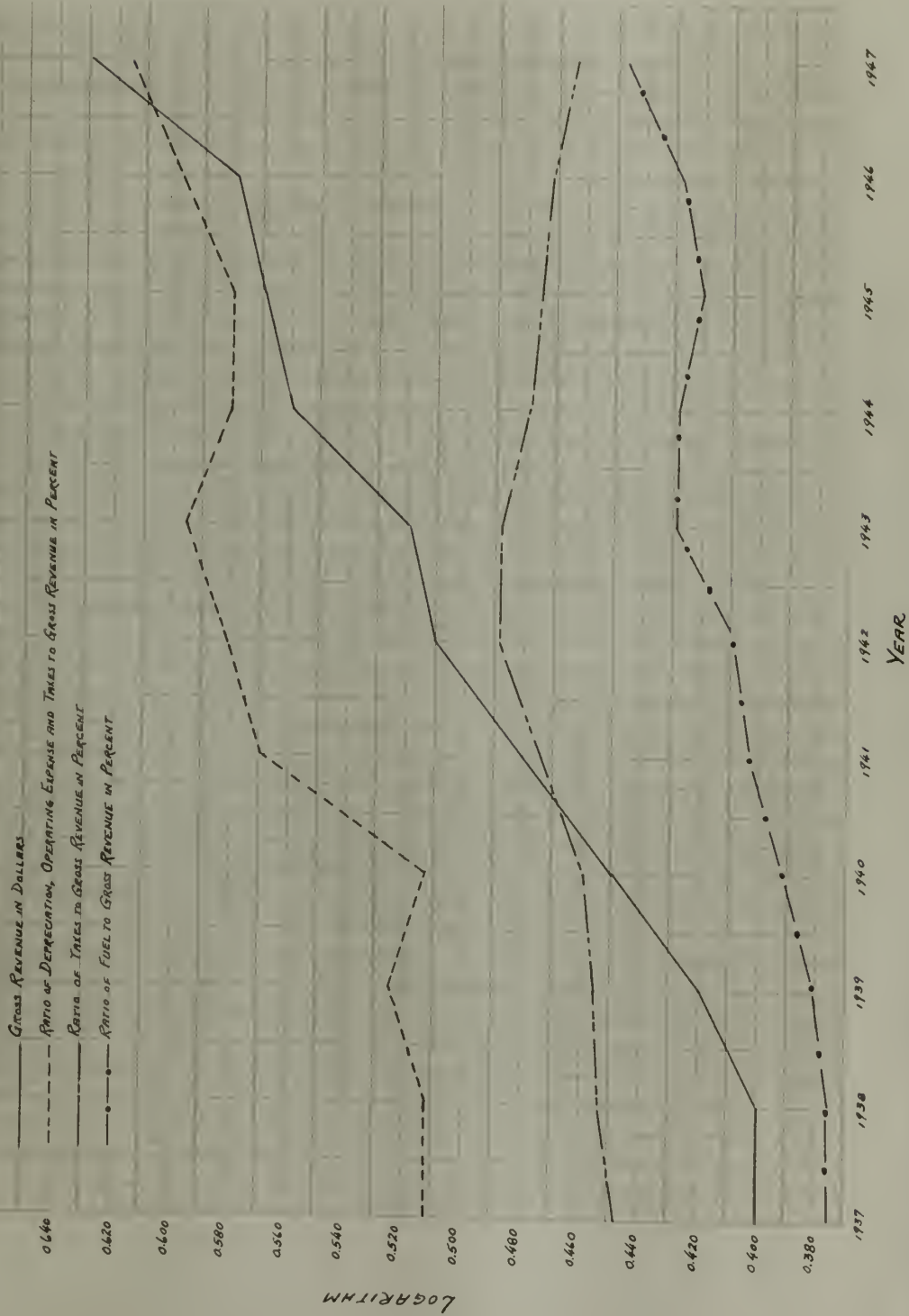
FIG. 16 — COMPARISON OF THE RATES OF GROWTH IN THE COMPONENTS ASSOCIATED WITH THE EXPENSE SIDE OF THE INCOME STATEMENT FOR THE PRIVATE ELECTRIC OPERATING UTILITY INDUSTRY 1937-1947
SOURCE—FEDERAL POWER COMMISSION, WASHINGTON, D.C.   STATISTICS OF ELECTRIC UTILITIES IN THE U.S. 1937-1947

and surplus accounts. Interest charges on the long-term
debt and dividends on the preferred stock were reduced by
about 33% and 22% respectively during the 1937-1947 period,
while dividends on the common stock were increased about
17%. The importance of the increases in net income is shown
by the fact that during 1941-1946 new securities financed
only 15% of the gross capital expenditures, while the re-
mainder was financed out of retained earnings and depreci-
ation accruals. Therefore it is concluded that the increas-
ing trend of the ratios of net income to net worth and net
income to gross revenues were made possible through savings
effected by the refinancing process just described.

The decreasing trend in the ratio of total utility
operating revenues to gross revenues shows the affect of rising
costs of operation, particularly the cost of wages and fuel,
and the resulting decline in the profit margin on sales.

3. Depreciation and Amortization to Gross Revenues

The ratio of depreciation and amortization to
gross revenues indicates a steeply rising trend from 1937 to
1939, as shown in Figure 13, page 104. After 1939 the trend
decreased sharply until 1940 where it remained constant through-
out the war years until 1946 when it began to decrease again
through 1947. From the standpoint of dollar value, this item
increased approximately 50% over the period analyzed. How-
ever, the increase in dollar value of gross revenues was about
in the same proportion as the dollar value in depreciation

and amortization, so that for the period 1940 through 1946
there was no change in the trend of this ratio. During the
1938 period the trend of depreciation was increasing faster
than the trend of gross revenues so that a rising trend was
indicated in 1939. Because the reverse happened after 1946,
a falling trend was indicated for the ratio during that
period. The rate of change in the trend of the ratio of de-
preciation and amortization to gross revenues, as indicated
by Figure 14, page 105, assumed the same form as the corres-
ponding curve in Figure 13. It would appear that after 1946
the industry was not setting aside sufficient sums for depre-
ciation because of its falling rate of growth as referred to
the increasing rate of growth in gross revenues. Therefore,
it is assumed that although this ratio over the decade an-
alyzed has been important in the financing of new construction
and in the reduction of the total of debt securities, its
importance from the standpoint of a reduction in the profit
margins on sales of the industry appeared to be of the same
importance as the ratio of taxes to gross revenues. From
the standpoint of the future, heavy expenditures will be re-
quired for the expansion of plant and equipment, as indicated
in Figure 13, and the annual depreciation charges which are
substantial and rising will probably effect but a small frac-
tion of the total supply of capital needed to finance future
plant expenditures at the current rate.

4. Operating Expenses

The term "operating expenses," previously defined
in this section, included three important cost items, namely,
the cost of fuel, the cost of salaries and wages, and the
costs of maintenance. The Federal Power Commission statistics
employed in this study do not provide yearly breakdowns for
each of these three items of cost, with the exception of fuel.
Salaries and wages and costs of maintenance are so involved
with accounting procedures that a true measure of their sep-
arate amounts was considered beyond the scope of this pre-
sentation. However, in the breakdown of production expenses
associated with the electric operating utility industry and
supplied by the Federal Power Commission under the heading
of "Composite electric operating expenses," the cost of fuel
for the industry was analyzed separately. It was found that
of the total production expenses, the cost of fuel accounted
for almost three-quarters of the total combined costs for
steam stations and stations employing internal combustion
engines for the production of electricity. Likewise, of the
total operating expenses, fuel and wages together represented
the greatest amount of the total.

The ratio of fuel to gross revenues, as shown in
Figure 13, page 104, indicates a trend which, on the average,
follows very closely the trend of gross revenues. The rising
trend of the ratio of fuel to gross revenues would, of course,

increase proportionally with increased power output, as reflected in the gross revenue curve. On the other hand, wages and maintenance were held fairly constant during the war period by Government regulation which offset to a large degree the increased fuel costs as reflected in the ratio of total operating expense to gross revenues.

After 1944 the trend of the ratio of fuel to gross revenues was observed to fall until 1945 when it increased again up to 1947. This action reflected the drop in kilo-watthour sales, indicated in Figure 9, Chapter IV, from 1944 to 1946 and the corresponding increase after 1946.

Dollar values of fuel increased about 300% for the period analyzed. The rate of growth of the ratio of fuel to gross revenues followed quite closely the increase in the rate of growth of gross revenues. During the period of 1941 to 1945 the affects of the demands of the war industry were clearly evident. After 1945 the rise in the rate of growth of this ratio shows also the affects of the reconversion slump following the ending of the war and the post-war boom which continued after 1947.

5. The Expense Ratio

The ratio of taxes, depreciation and operating expense to gross revenues, as indicated in Figure 13, page 104, follows the trend of gross revenues very closely over the decade analyzed. This ratio is known as the expense ratio. The total of the expense of operating the industry must be kept

within the margin of gross profit provided by sales. In
other words, if the rate of gross profit is found to be a
given percentage of sales, then the total operating ex-
penses, or the total income deductions from gross revenues
cannot exceed that rate and still have the industry show a
profit. This ratio is, in reality, the reciprocal of total
utility operating revenues, as indicated in Figure 9, Chap-
ter IV, and measures to a degree the extent to which expense
has been absorbed by increases in sales.

Figure 13 indicates the degree to which the trend
of the expense ratio has followed the trend of gross revenues.
The rise in the trend of the expense ratio during the war
years reflected to a large degree the increased taxes and the
resulting decline in the profit margins on sales to date,
shown in Figure 10, Chapter IV. The rate of growth of this
ratio, shown in Figure 15, page 108, further emphasizes the
previous statement. It is concluded that over the period
from 1942 to 1947 inclusive the industry has increased its
output substantially as a result of improved load factors.
Likewise, important savings were obtained by means of debt
retirements, and decreased fixed charges. This decrease in
fixed charges plus the savings produced by debt retirement
went far to offset increased taxes and higher labor and fuel
costs for that period. Furthermore, of the component parts
which make up the expense ratio, since 1940 fuel seems to
have accounted for a larger percentage increase than any

other expense item. Likewise, taxes were undoubtedly res-
ponsible for the greater part of the decline in profit margins
during the war. However, the peak of taxes was reached in
the 1942-1943 period and were declining. On the other hand,
wages, salaries and fuel were increasing over the period, and
in 1945 the costs of the latter two items caught up with the
decreases in taxes. Following 1945 the costs of wages and
fuel have increased sensationally. The removal of Govern-
ment war controls, directly after the ending of hostilities,
combined with the affects of the post-war boom, on costs
disturbed the previous relationship between the various ex-
pense items contained in the expense ratio, namely, taxes,
wages and fuel. In 1947 the industry was faced with a sit-
uation which involved substantial additional capital outlays,
and the prospect of continuing high labor and fuel costs,
with the only offsetting advantage in the elimination of ex-
cess profit taxes and reduced interest charges, as shown in
Figure 13. Notwithstanding these adverse factors, it is
reasonable to expect that increases in load and the reduc-
tion in the over-all costs due to improved efficiency will
continue to insure satisfactory earnings, provided there are
no further downward rate revisions in the existing rate
structure.

E. CONCLUSIONS OF THE STATISTICAL ANALYSIS

It is concluded from the results of the trend
analyses indicated by Figures 13, 14, and 15 that the value

of the ratio of operating expense to gross revenues over the decade analyzed increased about 9%. Likewise, the rate of growth in the trend of the ratio as compared with that of gross revenues was increasing at a greater rate, especially during the years 1946 and 1947. On the other hand, the ratio of depreciation and amortization to gross revenues indicated, on the average, a slightly decreasing trend. However, the ratio of taxes to gross revenues indicated a sensational increase in trend from 1937 to 1943 which was offset by an equally decreasing trend after 1943. The average of the trend of this ratio probably remained about the same for the period analyzed.

It is therefore concluded that with depreciation and taxes, on an average, the same over the period analyzed, the rise in the expense ratio--operating expenses and depreciation and amortization and taxes to gross revenues--was accounted for by increased costs of fuel and wages. Although the dollar value increase in taxes was over 100% between 1937 and 1945, the over-all effect of the other components of operating expenses--wages, salaries and fuel--was, on an average, greater throughout the decade analyzed.

It is evident that the components of the expense side of the profit and loss statement have changed; as indicated by the trend analysis, these ratios have changed in direction and amount. However, the important fact remains

that the rate of growth in operating expenses has rapidly approached the rate of growth in operating income; this means that the rate of growth in operating income has declined generally over the period. In other words, the growth in volume of the industry has covered up the increasing cost trends of fuel and wages and the decreasing income trend in the margin of profit on sales.

Furthermore, it was pointed out that gross revenues have increased substantially as a result of improved load factors over the decade analyzed. Also important savings were obtained through debt retirements, and substantial decreases in interest charges. This decrease in fixed charges through debt retirement plus the savings produced by refunding at lower rates went far to offset the increased costs of labor, materials and fuel. However, in 1937 it was indicated, in the light of future load demands, further increases in load, in spite of the high utilization of plant and the reduction in over-all costs due to improved efficiency of operations, might not insure a continuation of the existing operating income levels without important upward revisions in the rates for electric service. It is possible that this matter has been overlooked on the part of the commissions. The industry, as noted in the previous section of this chapter, has established an enviable record for making successive rate reductions from time to time. The savings derived from these rate reductions have been passed on to a large degree

to the consumer. These savings to the consumer in reality were derived from the reduced costs of operation and the increased volume of sales which accrued to the industry. Because these reductions have been so regular, there is a danger that the public and the commissions have taken for granted that the industry can and should make regular rate reductions in the future regardless of the rising costs of everything else.

F. IMPLICATIONS OF THE TREND ANALYSIS IN THE LIGHT
OF THE CURRENT UTILITY FINANCIAL PROBLEM

The implications of the trend analysis, as related to the current utility financial problem, appear to be associated with two general problems inevitably related. One is the problem of operation in a period of full employment, high level of business activity, and inflation; and the second main problem is a financial one involved with the war-delayed and post-war-stimulated expansion program of the electric operating utility industry.

The information presented by the statistical ratio analysis over the decade indicated that the rise in expenses has had a distinct bearing on operating profit. The growth of the operating profit did not keep pace with the growth in volume. It further appears that increases in load, in spite of the industry's high utilization of plant, may not be sufficient to restore the declining profits on sales. In fact

there is a good chance that under existing rate structures
operating income may further decrease. This fact will have
a distinct bearing on the return on the capital investment
and the problem of raising new capital required to finance
future demands for the expansion of plant and equipment.

As long as the industry remains in the category
of private industry, new capital must be raised in the com-
petitive markets and the utilities must vie with other invest-
ment opportunities offered by the public and private institu-
tions. However, the utilities can attract that capital only
on the promise that they can afford an adequate return to the
investor, and adequate returns today are related to adequate
rates, other things being equal. Furthermore, a relatively
large part of each dollar of gross revenues was spent on
carrying charges and depreciation; and this cost was shown
not to have risen appreciably. On the other hand, wages,
fuel and other maintenance costs increased even more sharply.
However, the very high level of gross revenues has made it
possible for the industry to absorb a large part of the in-
creased costs.

With regard to plant expansion as of 1947, the in-
dustry was unable at that time to provide new facilities as
fast as they were needed so that the increases in load were
provided for by means of facilities held in reserve. In
other words, the new investment, with its accompanying fixed
charges, has not been proportional to the increases in revenues.

While this situation undoubtedly helped current earnings, on
the other hand it has hindered the task of preparing for
future plant expansion. In conclusion, it is evident that
the most important problem confronting the industry is the
declining profit margins on sales caused by increased costs
of operation and reduced unit selling prices of electrical
energy. Up to the present date the effects of rising costs
and declining margins have been absorbed in growth. The
results of the statistical analysis, however, indicate that
an end is in sight relative to the industry's continued ab-
sorption of operating expenses in growth, unless upward ad-
justments are made in existing rate structures.

CHAPTER VI

INVESTMENT CONSIDERATIONS

A. GENERAL COMMENTS

Electrical energy, which developed from a feeble trickle sixty years ago when Thomas Edison established his first power station in downtown New York, has now grown to a mighty torrent serving the needs of men, women and children in all walks of life. At first a luxury, electric service is today a prime necessity and each year extends its use to regions previously unexplored.

Many types of research and effort have gone into this development from the realm of pure science to the most down-to-earth practical applications. It is a fact that all those who have worked with electricity--the researcher, the manufacturer of appliances, the technician in the field, and the great organization required to administer this complex service--have worked with one thought in mind--the advancement of and the increased comfort of mankind. From an investment standpoint, the securities of the private electric operating utilities have, since World War I, been held in high favor. The stability of return and a growth trend which has steadily increased have made the fixed obligations of the operating utility companies, especially during the past ten years, the first choice of the conservative investor in American business. An example of the attraction which utility securities hold for conservative investors is seen in the

make-up of the investment portfolios of the life insurance
companies. In 1926 these investments totalled 13 billion;
20% were in railroad securities, and only 7%, or 900 million
dollars, in utility securities. However, today the total is
51 billion dollars of which only 6% is in railroad securities
and nearly 15%, or 7½ billion, is in utility securities. (1)

B. LOAD ANALYSIS

An analysis of kilowatthour sales reveals that the
1947 sales figure of 230 billion kilowatthours was the highest
in industry history and was more than twice the figure of ten
years ago. The previous peak in sales was reached in 1944,
a war year, when 42% of the electricity delivered by the in-
dustry was absorbed in war production. Kilowatthour sales in
1947 topped the 1944 total by more than 23 billion kilowatt-
hours and were almost entirely devoted to peacetime purposes,
with 1947 sales ahead of the 1946 sales by about 27 billion
kilowatts. (2) This stability of revenues stems from the
essential character of electricity in the home as well as in
stores and other commercial establishments where lighting,
refrigeration, and similar needs are constant and have little
relation to immediate business volume. Wide fluctuations are,
however, associated with the consumption of power by industry,

(1) Temple, Alan H., A Look at Your Earnings, Edison Electric
     Institute, 420 Lexington Ave., New York, 1948, p. 1.

(2) Federal Power Commission, Statistics of Electric Utilities
     in the United States, Washington, D. C., 1947, p. XIX.

particularly the heavy goods lines. This type of industrial
load is sold at low rates at a low profit per kilowatthour
and its effect on electric earnings is minimized by all com-
panies except those with the most heavily industrialized
loads. One of the important factors which holds industrial
electric current costs to an economical figure is the matter
of competition of substitutes. If rates were to get out of
line, manufacturers would, in many cases, set up their own
power plants, as they have done in the past when the electric
utilities were not in a position to supply load, thus depriv-
ing the electric companies of an important source of volume
revenue. However, the same power plant that provides energy
for the demands of industry during the day within a given
area, with all the overhead and operating expenses entailed,
would be idle at night if it were not for the domestic load
used for lighting and other domestic and commercial appli-
ances.

In other words, the industrial load, which occurs
mostly during the daytime hours, has helped pay the freight
by cutting the cost of serving the high-rate residential and
commercial load. Thus the power companies have increased
profits measurably through further growth in residential and
commercial consumption brought about by the intensive sale of
new appliances.

C.   CUSTOMER ANALYSIS

Table IV is a summary of the number and classi-
fication of customers of the electric operating utility in-
dustry in the United States during 1947.

TABLE IV

Customers of the Electric Operating

Utility Industry 1947

Classification	Number	Per Cent
Residential	31,621,959	82 %
Commercial	4,960,895	13
Industrial	191,363	$\frac{1}{2}$
Others	1,657,733	$4\frac{1}{2}$
Total Ultimate Customers	38,431,950	100 %

Source: Edison Electric Institute Statistical Bulletin
1948, No. 15.

The total number of customers as of December 31, 1947,
includes an increase of over two million since the end of 1946
which is a year's growth unequalled in the history of the in-
dustry. Since the end of World War II, more than $4\frac{1}{2}$ million
new customers are buying electric service. (1) This increase
is more than the total number of customers added during the
first thirty years of the industry's existence. In 1922 the
electric light and power industry served 12,709,868 custom-
ers (2), while the total served in 1947 was more than three

(1)   The Edison Electric Institute, The Electric Industry,
      420 Lexington Ave., New York 17, N. Y., 1948, p. 7.

(2)   Ibid. p. 8.

times as great as in 1922.

Table V gives the rate of growth in the use of electric power in the home and the average cost per kilowatt-hour to the user over the years 1922 to 1947.

TABLE V

Kilowatthours Used and Costs of Electricity

in the Home 1922-1947

Year	Average Number of Kilowatthours Used Per Residential Customer	Average Revenue Per Kilowatthour	Average Annual Bill
1922	359	7.4¢	$26.50
1927	446	6.8¢	30.40
1932	601	5.6¢	33.70
1937	805	4.3¢	34.62
1942	1,022	3.7¢	37.51
1947	1,438	3.1¢	44.43

Source: Edison Electric Institute Statistical Bulletin
1948, No. 15.

In 1947 95% of the occupied homes in the United States had electrical power available to them and 92%, or 36,500,000 homes, were wired for electric service. (1) The average home consumer in 1947 used four times the amount of electricity used by the home consumer in 1922. On the other hand the average revenue per kilowatthour has been lowered by more than half (see Table V) during the 25-year period despite inflationary pressures in recent years. If the home consumer in 1947 had paid for the electricity he

(1) Ibid. p. 8.

used at the 1922 average, his annual bill would have been
over $106, a sum more than two and one-third times as great as
his actual average 1947 bill. Although the home consumer used
in 1947 four times the amount of electricity that was used in
1922, the average annual bill, as shown in Table V, increased
less than 68%.

TABLE VI

Per Cent of Kilowatthour Sales

of Electricity in 1947 by Customer Groupings

Classification	Per Cent
Industrial	52
Residential	20
Commercial	18
Railways and Railroads	3
Others	7
Total	100

Source: Edison Electric Institute Statistical
Bulletin 1948, No. 15.

Table VI gives the per cent of kilowatthour sales
of electricity in 1947 by customer groupings, in which cus-
tomers in the large industrial classification include manu-
facturing plants, industrial processors, textile, lumber,
mining and similar major industrial processes which consume
large amounts of electric power. Customers in the commercial
grouping include the smaller stores, shops, offices, factories,
filling stations, recreation services, etc.

Railway and railroad power sales include electricity
sold to street and interurban railways as well as electrified

steam railroads. Among the customers classified as others
are local, state and Federal authorities and street and
highway lighting.

A summary of the information contained in Tables IV,
V, and VI leads to the conclusion that the residential and
small commercial customers far outnumber the industrial and
miscellaneous customers in 1947 by a ratio greater than nine-
teen to one. The number of customers served by the industry
in all classifications has increased more than three times
since 1922 with the greatest rate of growth in the number
of customers served occurring during the post-war years.
The amount of electricity consumed by the industrial user
has increased more than three and one-half times, while the
residential user increased his consumption of electricity by
four times. (1) Although large industries accounted for
less than 1% of the total number of customers in 1947, they
consumed 52% of the electricity sold. Residential users,
comprising 82% of the number of customers, consumed 20% of
the electricity sold.

The growth of the industry since 1922 was due to
a most extensive and intensive use of electrical energy.
The large industrial customer supported most of the overhead
costs of the industry, while the residential and small com-
mercial customer provided most of the profits.

(1) The Electrical Industry by 1957, Prepared by the Market
    Development Department, Westinghouse Electric Corp.,
    1948, p. 15.

Along with residential, industrial and institutional
customers, the electric power companies serve the farms of
the United States--a steadily growing source of revenue which
is expected to increase as time goes on. According to the
Edison Electric Institute, (1) of the 3.8 million farms buying
electric service by the end of 1947, 481,000 were connected
during the year. An additional 750,000 farms were estimated
to have easy access to power lines at the end of 1947, but
were not served. Thus the total of about 4.6 million farms
served by, or having easy access to power lines represented
about 82% of the occupied farms of the United States. The
number of farms served, or within easy reach of power lines,
is expected to exceed 5 million customers by the end of 1948,
which is a 14% increase over the 1947 figure. Likewise, the
electric power industry has supplied electricity to about
four out of every five farms served by the Rural Electrifi-
cation Administration Cooperatives during 1947; and in ad-
dition it supplied 56% of the power sold by R. E. A. Cooper-
atives as of June 30, 1947. It should be noted that the
above data apply to bona fide farms where occupants are en-
gaged in agriculture only.

So important is this present and potential source
of revenue, and so great is the opportunity for service pre-
sented by it, that experiment and research are proceeding at

(1) Edison Electric Institute, Op. Cit., p. 11.

a rapid pace in the laboratories of power companies. Among
the developments promised will be the electronic stimulation
of plant life by which the size of vegetables, such as corn,
wheat and tomatoes, may be increased four or five times their
present size without affecting flavor, vitamin content or
nutritious value. The future use of electronics, as well as
the further use of existing appliances such as automatic
washing machines, refrigerators, electric cream separators
and milking machines, represents to the industry a great
potentially profitable market for electric energy.

D. GOVERNMENT REGULATION AND COMPETITION

Another important factor associated with the private
electric operating utility industry relative to investment
analysis is the matter of Government regulation and competi-
tion. State commissions exist in all states with the ex-
ception of Delaware and Mississippi. The power companies
may effect rate changes only after commission approval. The
rate base is the measure of the fair rate of return on the
property; and the commissions have allowed a rate of 6% to
7% as a fair rate of return, varying according to the type
of company. Although 6% to 7% may be considered as a reason-
able rate of return on investments, it may, when based on a
capital valuation far below the actual book value of the
corporation, reduce earnings to a vanishing point.

Another type of regulation is provided by the
Securities and Exchange Commission which administers the

Utility Holding Company Act. Its object is to move for the divestment and/or the dissolution of holding companies which do not serve the public interest according to statutory standards as interpreted by the Commission. In order to protect the public from the risks of investment loss, the utilities must secure the agreement of the S. E. C. before buying existing property, and before the refunding of existing debt. When new securities are issued, the form of the issue must conform to the Commission's standards associated with a balanced capital structure. Furthermore, the S. E. C. may also prescribe rules for dividend payments, solicitation of proxies and the sales of existing property or securities. This Commission could, if it pleased, control the entire financial operation of a company, or a series of companies. Such actions, if carried far enough, could result in full Government operation of the industry.

Government competition in the production of electricity with private enterprise, although a factor in the investment considerations relative to the private electric utility industry, is not considered to be detrimental. The private electric companies have supplied electricity to about four farms for every three served by the R. E. A. Cooperatives in 1947, and in 1947 also supplied about 56% of the power sold by the R. E. A. Cooperatives. Nevertheless, government properties, whether Federal, state or municipal, in competition with private interests establish a rate base which may act as

a false measuring stick for rate regulation for the following
reasons: (1) government properties theoretically pay no taxes
while the tax load on the privately owned utility is a heavy
one; (2) government properties may finance their plants with
low interest bearing tax-free bonds, while the income from
the securities of the private utilities is taxable; and
(3) government operation is not required to show a profit,
whereas each private corporation is organized for the one
purpose of showing profits to the investor commensurate with
the risk involved. It is because of the profit motive that
the private utilities have achieved operating efficiencies
which have paid the increased costs of a better grade of
public service, which has, in turn, sold the customer in
favor of the private service even though there was an existing
government service at hand.

E. SUMMARY OF INVESTMENT ANALYSIS

To sum up the investment considerations thus far
discussed as related to the electric operating utility indus-
try, the electric power companies regard themselves as public
servants and by means of increased engineering efficiencies
have provided service at progressively lower costs to the
consumer while asking no more than a reasonable rate of re-
turn on the invested dollar.

The electric operating company stocks are much less
highly leveraged than holding company stocks. The operating
companies' common equities are characterized by the stability

of earnings year in and year out, and their appeal is to those
seeking reasonably steady income rather than to those who de-
sire capital gains.

This stability of earnings stems from the essential
character of electricity in the home, as well as in stores
and other commercial establishments where lighting, refriger-
ation and similar needs are constant and have little relation
to immediate business volume. While electric sales maintain
a good degree of day-to-day stability, the long-term trend
continues upward as residential and commercial users acquire
more and more electrical appliances.

This long-term trend of sales and revenues has,
together with technological progress, enabled the electric
industry to maintain the bulk of its earning power despite
rate cuts, the constant advance in fuel and labor costs, and
a broad upward revision in the provision for depreciation and
even higher taxes.

Conservatism both in financing and in accounting
practices have been evident in the previous chapters of this
study. In part voluntarily and in part at the instigation
of regulatory authorities, the industry as a whole has elim-
inated write-ups and other inflationary items from the balance
sheet while at the same time increases were made in the re-
serves for depreciation and amortization.

Intensified regulation of the electric utilities
by both Federal and state authorities over the past decade

has created considerable investment uncertainty towards their
securities, particularly the common stocks. On the other
hand, the removal of allegedly inflationary items from the
balance sheet led to lower rate bases and thence to rate re-
ductions. However, the rate cuts in themselves did not neces-
sarily impair earnings since lower rates encouraged increased
use of electricity and thus restored revenues. A summary of
the favorable and unfavorable investment factors associated
with the private electric operating utilities is as follows:

1. Favorable Factors:

    a. Stability of operation reflecting the essential
        character of the service in homes and commerce.

    b. The long-term uptrend in electric consumption.

    c. The non-competitive character of the industry
        from a territorial point of view.

    d. Investment interest centered around property
        values rather than the management personnel.
        With the development of the industry, regulatory
        powers have increased and operating methods have
        become standardized. As a consequence, invest-
        ment interest now centers around property values
        rather than in the personnel of management.

    e. The debt burden is well within the industry's
        ability to carry and is financed at low interest
        rates.

       f.   The increasingly conservative accounting practices of the industry and the elimination of many write-ups and other inflationary items of plant accounts.

2. Unfavorable Factors:

       a.   The steady advance in operating costs, particularly wages and fuel prices, and the constant rise in taxes which now consume large amounts of gross revenues.

       b.   Repressive governmental policies such as subsidized public ownership and big public power projects that create in some areas a power supply far in excess of current normal requirements.

       c.   The efforts of the Federal Power Commission to encroach upon state regulation of electric companies.

       d.   The growing tendency to regulate earnings of the industry on the basis of historical costs in a period of rising prices. This matter refers to the rate base which does not necessarily coincide with the reproduction cost of the property less depreciation.

F.   ANALYSIS OF FINANCIAL STATEMENTS

In order to further fulfill the purpose of this chapter, the financial ratios used by Jordan (1) on standards of investment acceptability relative to the private electric operating utility industry are analyzed in the light of current statistics in order to provide an insight into the behavior of utility earnings, long-term growth, relative fluctuation of operating revenues, and other pertinent factors in the investment rating of utility securities.

The practical application of the analytical ratios as standards of investment acceptability requires the determination of five-year average records of the accounts involved in the make-up of each ratio discussed. The statistical material used in the computation of the following ratios was taken from the "Statistics of Electric Utilities in the United States," Federal Power Commission, Washington, D. C., for the years 1937 to 1947. All figures used are five-year averages of the reported figures contained in the above publication of the Federal Power Commission and cover the years 1937-1942 and 1942-1947.

1. During the five-year period of 1942 to 1947 the average of the peak loads for each year was 441.7 billion

(1)   Jordan, David F., Jordan on Investments, 4th Revised
       Edition, Prentice-Hall, Inc., New York, 1941, Chapter 21, p. 364.

kilowatts, an increase of 190% over the comparable figure of 152.5 billion kilowatts for the five-year period of 1937-1942, or an indicated annual gain of about 19%. (Corresponding Jordan value--4% gain.)

2. During the same period 1942 to 1947, the average annual output was 197.4 billions of kilowatthours which represented a gain of 134% over the 1937-1942 period, or an annual gain of 13%. (Corresponding Jordan value--3% gain.)

3. The average amount invested in fixed assets, which include plant and equipment, in the period 1942 to 1947 was 15 billion dollars, an increase of 34.6% over the 1937-1942 period, or an annual gain of 3.46%. (Corresponding Jordan value--5% gain.)

4. Operating revenues during the 1942-1947 period averaged 3.8 billion dollars which was an increase of 36% over the 1937-1942 period, or an annual gain of 3.6%. (Corresponding Jordan value--1½% gain.)

5. Operating expenses during the 1942-1947 period averaged 1.9 billion dollars, which was an increase of 46% over the 1937-1942 period, or an annual increase of 4.6%. (Corresponding Jordan value--2½% gain.)

6. Operating income during the 1942-1947 period averaged .8 of a billion dollars, which was an increase of 52% over the 1937-1942 period, or an annual gain of 5.2%. (Corresponding Jordan value--no change.)

7. Fixed charges during the 194 -1947 period averaged .3 billion dollars which was a decrease of 6.2% over the 1937-1942 period, or an annual loss of .6%. (Corresponding Jordan value--2½% gain.)

8. Net income during the 194 -1947 period averaged 56 hundredths of a billion dollars which was an increase of 7.8% over the 1937-1942 period, or an annual gain of .8%. (Corresponding Jordan value--1% loss.)

9. Depreciation during the 1942-1947 period averaged 36 hundredths of a billion dollars which was an increase of 23% over the 1937-1942 period, or an annual gain of 2.3%. (No corresponding Jordan value.)

10. Taxes during the 1942-1947 period averaged 72 hundredths of a billion dollars which was an increase of 44% over the 1937-1942 period, or an annual gain of 4.4%. (No corresponding Jordan value.)

11. Total securities outstanding during the 1942-1947 period averaged 12.6 billion dollars which was a decrease of 6.7% over the 1937-1942 period, or an annual loss of .7%. (No corresponding Jordan value.)

12. Common stock outstanding during the 194 -1947 period averaged 4 billion dollars which represented a decrease of 9.1% over the 1937-1942 period, or an annual loss of .9%. (No corresponding Jordan value.)

13. Preferred stock outstanding was unchanged for the period and represented an average of 2.1 billion dollars. (No corresponding Jordan value.)

14. Bonds outstanding during the 1942-1947 period averaged 6 billion dollars which represented a decrease of 7.7% over the 1937-1942 period, or an annual loss of .8%. (No corresponding Jordan value.)

A summary of the data just presented indicates that in spite of sizable gains in operating expenses, taxes and depreciation, net income has been maintained because the expense charges were absorbed in the increases in gross volume of the business. Total securities outstanding and the associated fixed charges decreased slightly which helped to support increased costs and maintain dividends on the common stock. It is also significant that an increase of 35% in fixed investment produced an increase in operating income of only 52% and a net income, before payment of dividends on the capital stock, of only 7.8%. However, although earnings have been maintained, the operating profit should have been greater during a period of such great expansion in gross sales. This latter fact emphasizes one of the most unfavorable factors in the utility investment problem--the growing tendency of the commissions to regulate the earnings of the industry on the basis of historical costs in a period of rising prices.

G. RATIO ANALYSIS

This section is devoted to a comparison of Jordan's standards of investment acceptability in the light of statistical data reported to the Federal Power Commission by the private electric operating utilities from 1937 to 1947 and

for the first nine months of 1948. These comparisons will
determine if Jordan's economic standards (1) have changed
from 1937 to October 1, 1948.

All of the statistical data used in the following
tables VII to XVIII have been taken from the "Statistics of
Electric Utilities in the United States," published by the
Federal Power Commission in Washington, D. C., from 1937 to
1948, and from Chapter 21 of "Jordan on Investments," by
David F. Jordan, in the fourth revised edition, published by
Prentice-Hall, Inc., New York, in 1941.

TABLE VII

Values of the Ratio of Fixed Assets to Gross Revenues

Five-Year Average	Industry Ratio	Jordan's Ratio
1937-1942	5.2	
1942-1947	4.0	
Average 1937-1947	4.6	4-5 for Steam Plants
1/1/48-10/1/48	4.3	10 for Hydro Plants

1. The Ratio of Fixed Assets to Gross Revenues

Table VII above gives the average value, both associ-
ated five-year averages and the value for the first nine months
of 1948 of the ratio of fixed assets to operating revenues for
the private electric operating utility industry as compared
with the corresponding Jordan ratio. Over the decade the lat-
ter five-year average of the ratio decreased from 5.2 to 4.0,
while the ten-year average was 4.6. The decline in the ratio,

(1) Jordan, David F., Loc. Cit.

as shown by the decreasing trend in the five-year averages
and the 1948 value, was due to the increase in load demands
which occurred during the period 1942-1947 and was a direct
effect of World War II. These increased load demands had to
be carried by a plant that normally would have been viewed
as undersized by the managers of the industry. However, it
was generally impossible, at that time, to expand the size of
the plants due to the difficulties encountered in securing
additional generating capacity.

The average value of 4.6 and the 1948 value for the
ratio of fixed assets to gross revenues, as shown in Table VII,
are within the limits of Jordan's standards of investment
acceptability for steam stations, but depart materially from
the corresponding standard of 10 for hydro stations. This
fact obtains because of the predominance of steam generating
capacity in use by the industry for many years. As of 1947
the steam generating capacity in use throughout the industry
exceeded that of the hydro capacity by about three and one-
half times, and this relation was found to exist unchanged
since 1926. (1) Of the total generating capacity consisting
of steam and hydro, it is expected that the average of 4.6
for the ratio would be biased more nearly in favor of the
steam plants in the light of the proportionally greater use
of this type of plant as an electric power producing medium.

(1) Edison Electric Institute, Op. Cit., p. 28.

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Therefore, it is concluded that the value of Jordan's standard
of investment acceptability of 4 to 5 for the ratio of fixed
assets to gross revenues is representative of the industry
ratio of 4.6 and that the industry in turn contains a plant
that is of optimum size in relation to load demand.

TABLE VIII

Values of the Ratio of Bonds Outstanding to Fixed Assets

Five-Year Average	Industry Ratio	Jordan's Ratio
1937-1942	45%	
1942-1947	40%	
Average 1937-1947	43%	Not to exceed 67%
1/1/48-10/1/48	40%	

2. The Ratio of Bonds Outstanding to Fixed Assets

As in Table VII, Table VIII shows the average value,
both associated five-year averages and the value for the first
nine months of 1948 of the ratio of bonds outstanding to fixed
assets for the private electric operating utility industry as
compared with the corresponding Jordan ratio. During the
period the latter of the two five-year averages of the ratio
declined from 45% to 40%, while the decade average was 43%.
The decline in the ratio, as shown by the decreasing trend
in the five year averages, is due to the fact that fixed assets
had a 3.5% average yearly increase while bonds outstanding
had an average yearly decrease of .7% over the decade analyzed.
This means that the value of the plant increased while the
value of bonded debt remained for all intents stationary,

indicating a similar conclusion reached in a previous chap-
ter that the industry as a whole has made important savings
through substantial decreases in interest charges accomplished
by the refunding and the refinancing of debt securities. The
decrease in fixed charges plus the savings produced by re-
funding at lower rates went far to offset the increased costs
of labor, materials and fuel. Besides maintaining dividends
on the common stock, the industry also was able to finance
required plant extensions out of depreciation reserves,
amortization funds and retained earnings after dividend pay-
ments. Of course the substantial increases in gross revenues
over the period contributed greatly towards strengthening the
financial position of the industry by absorbing a substantial
proportion of the increased costs in the increased revenues.

However, the value of Jordan's standard of invest-
ment acceptability for the ratio of bonds outstanding to fixed
assets of 67% is not representative when compared with the
corresponding industry ratio of 43%, over the decade analyzed.
Jordan's ratio allows for a higher ratio of debt to plant than
is considered fitting by either the commissions who regulate,
or the managers who administer the financial affairs of the
industry.

TABLE IX

Values of the Ratio of Bonds Outstanding

to Total Securities Outstanding

Five-Year Average	Industry Ratio	Jordan's Ratio
1937-1942	48 %	
1942-1947	47.5%	
Average 1937-1947	48 %	40-50%
1/1/48-10/1/48	48 %	

3. The Ratio of Bonds Outstanding to Total Securities
Outstanding

Table IX shows the relation between the values of
the industry ratio for the period 1942-1948 of bonds out-
standing to total securities outstanding and the corresponding
Jordan ratio. During the decade the latter 5-year average re-
mained unchanged, while the ten-year average was 48%, indi-
cating a very close agreement with Jordan's standard of 40-
50% for the ratio. The results of the data presented in
Table IX lead to the conclusion that Jordan's standard of
investment acceptability of 40-50% for the ratio of bonds
outstanding to total securities outstanding is representative
of the industry ratio of 48% and that the proportion of
bonded debt to total securities is of optimum value from an
investment standpoint for the decade analyzed.

TABLE X

Values of the Ratio of Depreciation Reserve to Fixed Assets

Five-Year Average	Industry Ratio	Jordan's Ratio
1937-1942	20%	
1942-1947	24%	
Average 1937-1947	22%	10% Minimum
1/1/48-10/1/48	18%	

4. The Ratio of Depreciation Reserve to Fixed Assets

Table X shows the relation existing between the
values of the industry ratio for the period 1942-1948 of
depreciation reserve to fixed assets and the corresponding
Jordan ratio. During the decade the value of the five-year
averages increased from 20 to 24%, while the value of the
ten-year average was 22%. The ten-year average of the in-
dustry ratio exceeds the corresponding Jordan ratio of 10%
minimum. This was due to the forced improvements in the in-
dustry's accounting for depreciation reserves by virtue of
the adoption of the uniform system of accounts effectuated by
the purposes of the Federal Power Act of 1935. The 4% increase
in the values of the industry ratio for the latter five-year
period shown in Table X, indicates the degree to which the
managers gave recognition and effect to the principle of de-
preciation accounting. This principle, which is a matter of
prime importance for the protection of consumers and investors
in the industry's securities, required a greater than 10%
minimum, as prescribed in Jordan's standard for the ratio,
for capital consumption namely the depreciation of property

and equipment in the course of service.

TABLE XI

Values of the Ratio of Common Stock Outstanding
to Total Securities Outstanding

Five-Year Average	Industry Ratio	Jordan's Ratio
1937-1942	38%	
1942-1947	32%	
Average 1937-1947	33%	30-40%
1/1/48-10/1/48	33%	

5. **The Ratio of Common Stock Outstanding to Total Securities Outstanding**

Table XI shows the average value and both asso-
ciated five-year averages of the ratio of common stock out-
standing to total securities outstanding for the private elec-
tric operating utility industry for the period 1937 to 1947
and the first nine months of 1948, as compared with the cor-
responding Jordan ratio. During the period the value of the
latter five-year average of the industry ratio decreased one
per cent, while the decade average was the same as the 1937
to 1942 average. The 1% decrease between the two five-year
averages is due to the fact that total securities outstanding
had a smaller average yearly decrease than the average yearly
decrease in common stocks outstanding.

However the value of the industry ratio is within
the limits of Jordan's ratio of investment acceptability,
indicating a properly balanced capital structure relative to
the ratio of common stock outstanding to total securities
outstanding.

TABLE XII

Values of the Ratio of Preferred Stock Outstanding
to Total Securities Outstanding

Five-Year Average	Industry Ratio	Jordan's Ratio
1937-1942	16%	
1942-1947	17%	
Average 1937-1947	17%	10-20%
1/1/48-10/1/48	15%	

6. The Ratio of Preferred Stock Outstanding to Total
   Securities Outstanding

Table XII includes the average value, both associ-
ated five-year averages and the value for the first nine months
of 1948 of the ratio of preferred stock outstanding to total
securities outstanding for the private electric operating
utility industry as compared with the corresponding Jordan
ratio. During the decade the value of the five-year averages
increased from 16% to 17% while the value of the ten-year
average was 17%. Preferred stocks over the decade increased
slightly in the same manner that common stocks decreased, as
pointed out in the previous discussion of Table XI.

However, the value of the industry ratio for the
decade is within the limits of Jordan's ratio of investment
acceptability indicating a properly balanced capital struc-
ture relative to the ratio of preferred stock outstanding to
total securities outstanding.

TABLE XIII

Values of the Ratio of Operating Expenses to Gross Revenues

The Operating Ratio

Five-Year Average	Industry Ratio	Jordan's Ratio
1937-1942	75%	
1942-1947	79%	
Average 1937-1947	77%	70% for Steam Plants
1/1/48-10/1/48	81%	55% for Hydro Plants

7. The Operating Ratio

Table XIII gives the average value, both associated five-year averages and the value for the first nine months of 1948 of the ratio of operating expenses to gross revenues for the industry as compared with the value of the Jordan ratio. During the period analyzed the latter five-year average increased from 75% to 79% while the decade average was 77%. The increase in the ratio was due to the combined increases in operating expenses consisting of fuel, taxes, wages, maintenance, and depreciation reserves which occurred during the war and post-war periods.

The average value of 77% for the ratio of operating expenses to gross revenues, as shown in Table XIII, although slightly higher than the value of the Jordan ratio for steam stations, departs materially from the corresponding ratio of 55% for a hydro station. The answer to this apparent discrepancy is the same answer found to exist in the analysis of the ratio of fixed assets to gross revenues in Table VII of

this section--that the decade average is biased more nearly
in favor of steam plant operations in the light of the
greater use of this type of plant as electric power producing
media. Therefore the ratio of operating expenses to gross
revenues, when compared with the corresponding Jordan ratio,
indicates a higher ratio for the decade analyzed. This higher
ratio on the part of the industry, in confirming the Jordan
ratio, explains the extent to which operating expenses have
been absorbed by the increases in gross revenues.

TABLE XIV

Values of the Ratio of Operating Income to Fixed Assets

Five-Year Average	Industry Ratio	Jordan's Ratio
1937-1942	5.3%	
1942-1947	5.4%	
Average 1937-1947	5.4%	5-7%
1/1/48-10/1/48	5.0%	

8. The Ratio of Operating Income to Fixed Assets

        Table XIV shows the relation between the values of
the industry ratio for the period 1942 to 1947 and the first
nine months of 1948 of operating income to fixed assets and
the corresponding Jordan ratio. During the decade both five-
year averages remained unchanged and the ten-year average is
within the limits of Jordan's standard of 5 to 7%. This in-
dicates a minimum fair rate of return for the industry which
is constant over the period analyzed.

TABLE XV

Values of the Ratio of Interest Charges to Gross Revenues

Five-Year Average	Industry Ratio	Jordan's Ratio
1937-1942	11%	
1942-1947	8%	
Average 1937-1947	10%	10-12%
1/1/48-10/1/48	7%	

9. The Ratio of Interest Charges to Gross Revenues

Table XV shows the relation existing between the values of the industry ratio over the period 1937 to 1947 and the first nine months of 1948 of interest charges to gross revenues and the corresponding Jordan ratio. During the decade the latter five-year average decreased from 11% to 8% while the ten-year average was 10%. The decline in the ratio as shown in the decreasing trend of the five-year averages is due to the fact that gross revenues enjoyed an average annual yearly increase of 3.6%, while interest charges had an annual yearly decrease of .6%, thereby indicating a reduction in the costs of capital for the industry as a whole, which has in turn been passed on to the consumer in the form of lower rates. Therefore it is concluded that the value of Jordan's standard of 10 to 12% for the ratio of interest charges to gross revenues is respresentative of the corresponding industry ratio of about 10%, or slightly less during 1948, which reflects the reduced cost of capital over the period analyzed.

TABLE XVI

Values of the Ratio of Operating Income to Interest Charges

Five-Year Average	Industry Ratio	Jordan's Ratio
1937-1942	2.4	
1942-1947	2.7	
Average 1937-1947	2.6	2-3
1/1/48-10/1/48	2.5	

10. The Ratio of Operating Income to Interest Charges

Table XVI shows the relation existing between the values of the industry ratio over the period 1937-1947 and the first nine months of 1948 of operating income to gross revenues and the corresponding Jordan ratio. During the decade the latter five-year average increased from 2.4 to 2.7 times while the ten-year average was 2.6, which is representative of the Jordan standard for the ratio. The increases in the value of the industry ratio reflect an improved coverage for debt charges resulting from a substantial reduction in the rates of interest, a reduced volume of outstanding debt previously mentioned, and increased operating revenues. The improved coverage for debt charges, from the standpoint of the quality of the industry's outstanding bonds, indicates that the decade average of 2.6 exceeds the minimum standard of two times for bonds of good quality, but is less than the minimum standard of three times for bonds of the best quality. In other words, the senior securities of the electric operating utility industry are of a very high standard of quality from an investment standpoint.

TABLE XVII

Values of the Ratio of Net Income to Gross Revenues

Five-Year Average	Industry Ratio	Jordan's Ratio
1937-1942	19%	
1942-1947	15%	
Average 1937-1947	17%	15-20%
1/1/48-10/1/48	16%	

11. The Ratio of Net Income to Gross Revenues

Table XVII shows the relation existing between the
value of the industry ratio of net income (after the payment
of interest charges) to gross revenues between 1937 and
October 1, 1948, and the corresponding Jordan ratio. The
decline in the ratios, as shown by the 1942 to 1947 five-
year average and the ten-year average is due to the gross
revenues which are increasing at a much greater rate than
that of net income. This means that the greater part of the
increase in gross revenues has been absorbed in the rising
costs of operation, depreciation and taxes with the result
that the margin of profit remaining for the capital stock and
surplus accounts has been maintained at a nearly constant
amount over the decade. However, in spite of the declining
profit margins in gross sales, the industry ratio of 17%
for the decade is within the limits of Jordan's standard of
financial acceptability of 15% to 20%, thereby indicating a
proper amount of income available to the capital stock and
surplus accounts.

TABLE XVIII

A Summary of Computed Financial Ratios of

the Electric Operating Utility Industry

December 1937 to October 1, 1948

as Compared with the

Corresponding Ratios of Jordan

Item	Industry Ratio		Jordan's Ratio	Table No.
	1937-1947	10-1-48		
Fixed Assets Gross Revenues	4.6%	4.3%	4-5 for Steam Plants 10 for Hydro Plants	VII
Bonds Outstanding Fixed Assets	43 %	40 %	Not to Exceed 67%	VIII
Bonds Outstanding Total Securities Outstanding	48 %	48 %	40-50%	IX
Depreciation Reserve Fixed Assets	22 %	18 %	10% Minimum	X
Common Stock Outstanding Total Securities outstanding	33 %	33 %	30-40%	XI
Preferred Stock Outstanding Total Securities outstanding	17 %	15 %	10-20%	XII
Operating Expenses Gross Revenues	77 %	81 %	70% for Steam Plants 55% for Hydro Plants	XIII
Operating Income Fixed Assets	5.4%	5.0%	5-7%	XIV
Interest Charges Gross Revenues	10 %	7.0%	10-12%	XV
Operating Income Interest Charges	2.6%	2.5%	2-3%	XVI
Net Income Gross Revenues	17 %	16 %	15-20%	XVII

Sources: Jordan, D. F., Jordan on Investments, Chapt. 21 and
Federal Power Commission, Statistics of Electric
Utilities in the United States, 1937-1947.

H. CONCLUSIONS OF THE RATIO ANALYSIS

An examination of Table XVIII, page 151, of this
section, leads to the conclusion that, with the exception of
the ratios of bonds outstanding to fixed assets, depreciation
reserves to fixed assets, and operating expenses to gross re-
venues, the industry ratios are fairly representative of Jor-
dan's financial standards of investment acceptability for the
period analyzed. With regard to the ratio of bonds outstanding
to fixed assets, the industry ratio is 24% lower, and as of
September 1948 27% lower, than the corresponding Jordan ratio
which indicates that the industry could increase the amount
of funded debt considerably without unbalancing the existing
capital structure. A higher percentage of interest-bearing
securities would result in tax savings at the present high-
level tax rates; and these savings together with additional
retained earnings, could help to pay off the debt faster,
thereby working to a better advantage than a lower debt ratio
and higher percentages of common and preferred stocks which
are extremely hard to promote.

The value of the industry ratio for depreciation
reserves to fixed assets, although high, is decreasing as
compared with the corresponding Jordan ratio. This was due
to the forced improvement in the industry's accounting for
depreciation reserves brought about by pressure exerted on
the industry's accounting procedures by the Federal Power Act
of 1935. By the year 1945 the reserve for depreciation of
utility plant had increased over 100% of the 1937 values

primarily for the purpose of removing inflation from past
write-ups which were contained in the utility plant. During
the same time the value of utility plant decreased, r sulting
in a higher value of the ratio than provided for by Jordan.
However, in the light of future plant extensions, the value
of this ratio is beginning to return to a value more clearly
comparable with that of the standard--a minimum of 10%.

The ratio of operating expenses to gross revenues,
frequently referred to as the "operating ratio," is consider-
ably higher than the corresponding Jordan ratio. As pre-
viously noted, the growth in gross revenues has increased sub-
stantially over the decade analyzed. However, the rate of
growth in operating expenses is rapidly approaching the rate
of growth in operating income which means that operating ex-
penses are consuming greater and greater proportions of the
increases in gross sales. This means that the operating ratio
will increase still further unless rate increases are granted
by commissions, or unless expenses and depreciation charges
are reduced. The most obvious solution to the problem is an
over-all increase in electric rates which would, in effect,
reduce the height of the operating ratio to values more nearly
comparable with Jordan's ratio of investment acceptability.

In sum, during the decade of 1937 to September 1948
the electric operating utility industry has managed to main-
tain its strong financial position in spite of the sometimes
repressive governmental policies, the steady advance in

operating costs, and the reduction in selling prices of electrical energy. However, the industry is confronted with a huge expansion program estimated by the Edison Electric Institute at 6 billion dollars. (1) A certain proportion of the new capital must come from the sale of common stock. Although a certain percentage of investors are contented with fixed returns from common stocks, the majority of investors, especially from the standpoint of income taxes, demand common stocks which promise both a growth in earnings and an associated capital appreciation. Utility common stocks must show this type of growth in order to appeal to this class of investor if the industry is to procure the necessary amount of equity funds and maintain a balanced capital structure.

When the possibility of increasing earnings by reducing operating expenses and interest charges are exhausted, then the only alternate is to raise rates and increase the proportion of equity capital contained in the capital structures of the industry. Managements of companies facing a definite need of higher rates should be aggressive in seeking them from the commissions; and the commissions should recognize their responsiblity to the investor and the consumer and do their part to keep the industry's financial position in the future as strong as it has been over the previous decade analyzed.

(1) Edison Electric Institute, Op. Cit., p. 4.

CHAPTER VII

SUMMARY

It is obviously impossible to look into the future and foretell exactly what is going to happen, yet it is equally obvious that some such attempt should be made each time that the investor buys the securities of a business enterprise.

Subject to the reasonableness of the underlying assumptions contained in the previous chapters of this study, it appears that the investment soundness of the electric operating utility industry is good—just as good today as it was in 1937.

It is also assumed that the status quo will continue, by and large, subject to the varying influences of the established trends, and to the developments that may either be beginning to assert themselves, or to be anticipated in the foreseeable future.

In the case of the electric utility industry, a continuing upward trend in sales appears certain. Virtually every aspect of electric utilization is susceptible to further development; electricity is a form of adaptable energy that still has almost unlimited applications. Moreover, it is assumed that the future growth of the industry will be financed predominantly by means of private capital.

However, it is the duty of the management and regulatory bodies to work to the end that the common stocks of

the industry will continue strong and inherently attractive.
Unregulated industries may raise the prices of their products
in order to meet the increased costs of wages, fuel, taxes
and raw materials consumer in the manufacture of their res-
pective products. These unregulated industries are, therefore,
able to augment the decreased purchasing power of the dollar
by charging higher prices for their products. Also their ap-
peals for further capital are fully strengthened by larger
returns on the original investment, thereby indicating a more
attractive return on the new capital investment. Therein
lies the incentive for further capital investment when the
need arises.

The utilities, on the other hand, have not been
able to enjoy the position of the unregulated industries. By
and large, the rate of return of the utilities has been un-
duly restricted under standards of the past. In order to
meet the prevailing high costs of operation and to provide
the enormous amount of capital required to meet the demands
for new plant and equipment, a more realistic approach to the
problem of an adequate rate of return for existing and for new
capital employed will have to be developed.

The attraction of new capital to the utility indus-
try will, of course, require the assurance to investors of an
adequate return. The economics of the industry should prac-
tically guarantee such a return since the cost of the service

to the consumers is far below that of any acceptable substitute, and from a regulatory viewpoint there is sufficient evidence that rates necessary to produce earnings will be allowed.

In the same vein, the trend by management to increase the debt ratio in the industry by means of the sale of disproportionate amounts of debt securities should be discouraged within limits of practicality. Probably the industry could support a considerably higher debt ratio than that indicated without undermining the investment quality of its bonds. Also bond quality could be measured, not by arbitrary balance sheet ratios, but by earnings protection afforded by charges earned under conditions of adversity; and in this respect the electric industry is in an enviable position.

However, the debt trend should be reversed in spite of the attraction of low interest rates, tax credits on interest charges resulting in somewhat higher earnings on the common stocks, and the readily accessible vast pools of public savings held by institutions. If the future requirements for plant extensions have to be fulfilled suddenly, it is evident that if borrowing capacity, which is the last resource in emergency, has been fully utilized, it will not be available when needed. Such a condition would discourage even further the sale of equity capital.

As previously stated, it is concluded that the future growth of the utility industry will be financed predom-

inantly by private capital. There are as yet no indications
of importance which would lead to the conclusion that complete
nationalization of the industry is part of the future plan
for this country, and in this respect there has been no dif-
ferentiation made in this study between the electric power
business and other industry. The progressive benefits re-
sulting from private enterprise in the power field, as in other
industries, constitute too powerful an argument to be rejected
by an informed people.

The statistical treatments and their results con-
tained in this study are not intended to be an exact forecast
of what is going to happen in the future; rather they are in-
tended to act as an indication, as accurate as possible, of
the financial pattern of the industry between the years 1937
and 1947.

AN EVALUATION OF ECONOMIC

AND FINANCIAL STANDARDS

FOR ELECTRIC OPERATING UTILITIES

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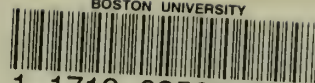the Market Development Department.